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AN ANALYSIS OF COST AND PROFITABILITY OF ARECANUT CULTIVATION IN SHIVAMOGGA DISTRICT AT KARNATAKA

Gayathri B A[1] & Prof. M S Ramananda[2]

[1]Research Scholar, Department of Studies and Research in Economics, Karnataka State Open University, Mysuru, India.

[2]Research Guide, Chairman, Professor, Department of Studies and Research in Economics, Karnataka State Open University, Mysuru, India.

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Keywords	***Abstract***
Arecanut Cultivation, Cost and Profitability.	Arecanut is the main crop of the Western Ghats of Karnataka, as it produces well in high rainfall hilly areas. Shivamogga is one of the main districts it producing the arecanut under a multi-storeyed cropping system. This region has been earmarked as a traditional arecanut growing district since ancient. Shivamogga district is a major areca nut producing region in Karnataka, with a substantial area under cultivation and a substantial production volume. The total area under arecanut cultivation in Shivamogga district is almost 94,077.50 hectares. This represents a significant share of Karnataka's total arecanut cultivation, yielding around 52,781 metric tons. The study has been conducted to understand the cost of cultivation and profitability of arecanut cultivation in the study area. A random sampling design was employed for picking farmers and about 60 farmers were interviewed from the Shivamogga district in Karnataka. The study was conducted with the help of a pre-tested schedule through the personal interview method. The results of the study show that the total cost incurred for the establishment of a one-acre arecanut cultivation was 1091000. This figure includes expenses for land preparation, planting, planting material, fencing, and other initial costs. The annual maintenance cost

Gayathri B A, Ramananda M S (2026). *An Analysis of Cost and Profitability of Arecanut Cultivation in Shivamogga District at Karnataka. International Journal of Multidisciplinary Research & Reviews, 5(si2). 12-23.*

	including rental value of owned land was 85500 after 6 years. The gross income and cost obtained from the one-acre arecanut cultivation were 1125000 and 1091000 respectively from 10 Years. After 10 years, overall total cost incurred per acre was 85500 for matured plants. The gross and net returns obtained from the one-acre arecanut cultivation were 350000 and 2,65,000 respectively in current year. However, it can also be found that there is a negative corelation between area in cultivation and cost of cultivation of arecanut cultivation and there is a significant positive corelation between area in cultivation and income earning capacity from arecanut cultivation in study area.

1. INTRODUCTION

Areca nut (betel nut) is a major commercial crop in the Shivamogga district of Karnataka. The region's favorable agro-climatic conditions support its cultivation, making it a significant income source for farmers. Shivamogga district in Karnataka is a major arecanut-producing region, with an increasing area under cultivation. The district's Malnad region, known for its favorable climate, has traditionally been a center for arecanut cultivation, but cultivation is now extending to semimalnad regions due to increased demand. Shivamogga's arecanut production is significant, with a large area under cultivation and a substantial amount of production. Areca nut cultivation plays a significant socio-economic and agricultural role in Shivamogga district, which is part of the Malnad region of Karnataka. The district's climate and geography are well-suited for this crop, making it a dominant agricultural activity. Areca nut is a key commercial crop in Shivamogga district with a significant area under cultivation and a substantial production volume. The total area under arecanut cultivation in Shivamogga district is approximately 94,077.50 hectares. This represents a significant portion of Karnataka's total arecanut cultivation, yielding around 52,781 metric tons. Areca nut is the major source of income for a large segment of farmers in Shivamogga. It creates year-round employment, both on farms (for planting, maintenance, and harvesting) and in processing activities. Especially crucial for small and marginal farmers, who depend heavily on the annual income from areca nut sales. The crop has led to the development of local markets and trade networks across Karnataka and other states. Areca plantations dominate the cultivated area in many parts of the district, especially in Sagar, Thirthahalli, and Hosanagara taluks. The area under cultivation has been gradually increasing due to favorable market prices and farmer preference for high-value crops. Areca nut cultivation is central to the economic resilience, agricultural landscape, and cultural identity of Shivamogga district. While it brings prosperity, diversification and sustainable practices are needed to safeguard its long-term viability.

2. REVIEW OF LITERATURE

Mr. Bangarappa bankapur and others (2018) "Growth in Area for Arecanut Cultivation and Production in Shivamogga and Uttara Kannada Districts: A Comparative Study" In this study, the area under arecanut cultivation and its production in Shivamogga and Uttara Kannada

districts have been analyzed using the Compound Annual Growth Rate (CAGR). The analysis reveals that the highest CAGR for area under arecanut cultivation is observed in Sagar taluk of Shivamogga district at 5.81%, and in Haliyal taluk of Uttara Kannada district at a significantly higher 81.71%. Similarly, in terms of production, the highest CAGR is recorded in Shivamogga taluk at 4.55% and again in Haliyal taluk at 81.71%. These results indicate that Uttara Kannada district has maintained a consistent and robust growth in both areas utilized for arecanut cultivation and in its production. In contrast, Shivamogga district shows an inconsistent growth pattern—despite having a relatively high growth in area under cultivation, the growth in production has not kept pace. This suggests that while Shivamogga is expanding its cultivation area, its productivity gains are comparatively limited.

N. Ashoka and others (2021) "Arecanut Plantation for Enhancing Farmer's Income: An Evidence from Karnataka State" The study analyzed arecanut cultivation in Karnataka, focusing on area growth, seedling demand, shifting cultivation patterns, investment trends, and profitability. Based on both primary and secondary data, the study applied compound annual growth rate, Markov chain analysis, cost concepts, and project evaluation techniques. Key findings include: Arecanut cultivation area grew at an annual rate of 9%, driven by better prices and institutional support. Seedling demand was projected at ₹694.42 lakh to cover an additional 50,688 hectares in 2021–22. Dakshina Kannada and Shivamogga showed high area retention, each maintaining 66% of previous arecanut area. The net establishment cost with subsidy for agripreneurs was estimated at ₹2,02,002 per hectare. Investment in arecanut agripreneurship was found to be economically and financially viable.

3. RESEARCH GAP

The literature survey revealed some of the study was related to issues like Role of arecanut Cultivation in Enhancing Farmer's Income. Some studies are also related to economics of Areca nut Cultivation there are only few studies focused on Growth in Area for arecanut Cultivation, Production and marketing of arecanut. Thus, the review of literature clearly shows that there is dearth of studies relating to Cost and Profitability of Areca nut Cultivation in Shivamogga District at Karnataka. Hence, Future research should adopt a multidisciplinary approach incorporating varies cost incurred in Areca nut Cultivation, the present study makes an attempt to explore Cost and Profitability of Areca nut Cultivation in Shivamogga District at Karnataka.

4. OBJECTIVES OF THE STUDY

1. To find out the cost and profitability of areca nut cultivation in study area.
2. To examine the corelation between area in cultivation and cost of cultivation also income earning capacity from arecanut cultivation in study area.

Hypothesis of the Study

The following hypothesis have been framed in the present study

Gayathri B A, Ramananda M S (2026). *An Analysis of Cost and Profitability of Arecanut Cultivation in Shivamogga District at Karnataka. International Journal of Multidisciplinary Research & Reviews, 5(si2). 12-23.*

- There is a negative corelation between area in cultivation and cost of cultivation of arecanut cultivation in study area.
- There is a significant positive corelation between area in cultivation and income earning capacity from arecanut cultivation in study area.

5. METHODOLOGY

The present study uses both secondary and primary data. The secondary data will be collected from horticulture department of Karnataka. The time series data will be used for the growth analysis. The primary data will be collected from field study using appropriate methodology. A Random Sampling Design was employed for selecting farmers and about 60 farmers were interviewed from the central Shivamogga district in Karnataka. The study was conducted with the help of a pre-tested schedule through the personal interview method. Both descriptive and inferential statistics will be used for data analysis. The econometric frontier methodology will be used for productivity analysis. After collection of data, these are arranged in tabular format. The analysis was done by using different statistical tools and the analysed data are presented in tabulated form. The data is analysed by using the Simple tables, chart, rank method is used to analyses the data, and Pearson correlation test was used to Hypothesis testing.

➢ Arecanut cultivation in Karnataka

Arecanut cultivation in Karnataka is not just a profitable crop but a pillar of rural development, sustaining the livelihoods of millions. Arecanut cultivation plays a vital role in Karnataka's agricultural, economic, and social landscape. The state is the largest producer of arecanut in India, contributing significantly to farmer livelihoods, rural employment, and regional development. Its strategic importance in the economy, agriculture, and society underscores the need for sustainable practices, value addition, and price stabilization mechanisms. The cultivation of arecanut in Karnataka has expanded in terms of area, but the yield and total production have shown fluctuations due to various agro-climatic and management factors.

Table 1: Area, Production and Yield of Arecanut Cultivation in Karnataka (Area in Hectares, Production in Tonnes, Yield in Kgs/Hectare)

Years		Area	Production	Yield
2020-21	Raw nuts	560877	6160238	11207
	Processed	560877	1232038	2241
2021-22	Raw nuts	615430	6615561	1096
	Processed	615430	1322218	2192
2022-23	Raw nuts	688582	5120585	7588
	Processed	688582	1024117	1518

Source: Report on area, production and yield of principal crops in Karnataka 2022-23.

Table 1 presents data for both raw and processed areca nuts in Karnataka over three years, highlighting changes in cultivation area, total production, and average yield. he area under areca

nut cultivation has increased significantly from 560,877 ha in 2020–21 to 688,582 ha in 2022–23, showing continued farmer interest in the crop. Raw nuts Production peaked in 2021–22 but declined in 2022–23, possibly due to adverse weather or disease outbreaks. Processed nuts Follows a similar pattern, with a decline from 1.32 million MT in 2021–22 to 1.02 million MT in 2022–23. Yield dropped substantially for both raw and processed nuts in 2022–23, indicating a drop in productivity per hectare. While the cultivated area for areca nut in Karnataka has increased steadily, productivity and total output dropped in 2022–23, likely due to climatic stress, pest issues, or input challenges. This highlights the need for sustainable agronomic practices and better disease management.

Table 2: Area, Production and Yield of Arecanut Cultivation in Shivamogga District at Karnataka in 2022-23 (Area in Hectares, Prodcution in Tonnes, Yield in Kgs. per Hectare)

Arecanut (Rawnuts)			**Arecanut (Processed)**	
Area	**Production**	**Yield**	**Production**	**Yield**
121261	760549	6400	152110	1280

Source: Report on area, production and yield of principal crops in Karnataka 2022-23.

Table 2 provides key data on arecanut cultivation in Shivamogga district for the year 2022–23, covering both raw and processed arecanuts. Arecanut is cultivated over 121,261 hectares in Shivamogga, reaffirming the district's major role in Karnataka's arecanut production. The district produced 760,549 tonnes of raw arecanut and 152,110 tonnes of processed arecanut. The average yield stands at 6,400 kg/ha for raw nuts and 1,280 kg/ha for processed nuts, reflecting standard conversion and processing loss ratios. Shivamogga is a key hub for arecanut cultivation in Karnataka, with large-scale production and significant processing activity.

- **SURVEY BASED ANALISIS ANA DATA INTERPRETATION**

A survey of twenty villages of Shivamoga district of Karnataka state has been conducted 60 of Arecanut Cultivators have been interviewed through questionnaire. The research findings are as follows,

Table 3: Distribution of Gender, Age and qualification of respondents and factor influenced involved in Arecanut Cultivation

Characteristics		**Respondents**	**Percentage**	**Rank**
Distribution of Gender	Male	40	66.66	01
	Female	20	33.34	02
Distribution of Age	25 to 30	10	16.66	03
	30 to 35	12	20	02
	35 to 40	06	10	04
	40 and above	32	53.33	01
Qualification	Illiterate	02	3.33	4
	Primary and Higher	10	16.66	3

Gayathri B A, Ramananda M S (2026). *An Analysis of Cost and Profitability of Arecanut Cultivation in Shivamogga District at Karnataka. International Journal of Multidisciplinary Research & Reviews, 5(si2). 12-23.*

	Primary			
	PUC and above	30	50	1
	Degree and above	18	30	2
Occupation	Agriculture	30	50	01
	Agriculture and Service Business	20	33.33	02
	Agriculture and Service	10	16.66	03
Land Holding	Below 2.5 Acre	20	33.33	02
	2.5 to 5 acres	22	36.66	01
	5 to 7.5 acres	10	16.66	03
	7.5 to 10 acres	08	13.33	04
Years of experience in Arecanut cultivation	Up to 10 years	20	33.33	02
	10 to 15 years	28	46.66	01
	15 to 20 years	12	20	03
Distribution of House hold income	Less than 2.5 lakhs	02	3.33	05
	2.5 to 5 lakhs	12	20	04
	5 to 7.5 lakhs	20	33.33	01
	7.5 to 10 lakhs	16	26.66	02
	10 and above	10	16.66	03
Share of Income from Arecanut cultivation	Less than 2.5 lakhs	18	30	01
	2.5 to 5 lakhs	16	26.66	02
	5 to 7.5 lakhs	14	23.33	03
	7.5 to 10 lakhs and above	12	20	04

Source: field survey

Table 3 shows that all these factors influenced to involved in Arecanut cultivation. Above table explained that out of the total 60 respondents 66.66% are male and 33.34% are female.

Majority of them that is 53.33% of them are aged between 40 years and above. 16.66% of them are aged between 25 to 30, 20% respondents are aged between 30 to 35years, only 10% age between 35 to 40.

50% of respondents are having PUC, 30% of them having degree. 16.66% respondents are having Qualification up to Primary and Higher Primary And only16.66 of them are illiterate.

50% of responds are depend on only in agriculture, 33.33% respondent are Agriculture and Service Business, 16.66% of them Agriculture and Service.

36.66% of respondents having 2.5 to 5 acres, 33.33 % of respondents having below 2.5 acre of land, 16.66% of them having 5 to 7.5 acres, 13.33% of them having 7.5 to 10 acres.

46.66% of the having 10 to 15 years of experience in Arecanut cultivation, 33.33% of them having up to 10 years of experience, and 20% of them having 15 to 20 years of experience in ginger cultivation.

Gayathri B A, Ramananda M S (2026). *An Analysis of Cost and Profitability of Arecanut Cultivation in Shivamogga District at Karnataka. International Journal of Multidisciplinary Research & Reviews, 5(si2). 12-23.*

3.33% of respondent's family income Less than 2.5lak, 20% of them have 2.5 to 5 lakhs, 33.33% of them have 5 to 7.5 lakhs, 26.66% of them have 7.5 to 10 lakhs and 16.66% of them have 10 and above family income per year.

30% of respondents got Less than 2.5 lakhs in their total income from only Arecanut cultivation, 26.66% of them got 2.5 to 5 lakhs, 23.33% of them got 5 to 7.5 lakhs, 20% of them got 7.5 to 10 lakhs and above from Arecanut cultivation total family income.

Table 4: Average per Acre Cost of Cultivation of Arecanut in study area

Particulars		Age of the Plantation (in years)									
		1	2	3	4	5	6	7	8	9	10
Rental value of Owned land		20000	20000	20000	20000	20000	20000	20000	20000	20000	20000
Land Preparation		25000	10000	10000	10000	10000	10000	10000	10000	10000	10000
Planting Material		25000	4000	1000	-	-	-	-	-	-	-
Infrastructure (Bore well & fence etc)		2,00,000	-	-	-	-	-	-	-	-	-
Irrigation (Drip/Sprinkler)		25000	5000	5000	5000	5000	6000	6000	6000	6000	6000
Labors		25000	8000	8000	8000	10000	10000	10000	10000	10000	10000
Depreciatin		-	5000	5000	5000	5000	5000	5000	5000	5000	5000
Maintenan	Fertilizatin	50000	5000	5000	5000	8000	10000	12000	15000	15000	15000
	Organic Manure	10000	10000	10000	10000	12000	12000	12000	12000	12000	12000
	PlantProtection Chemical	3000	4000	3000	3000	5000	5000	5000	5000	5000	5000
Transport		4000	1000	1000	1000	2500	2500	2500	2500	2500	2500
Total		**3,87,000**	**72000**	**68000**	**67000**	**77500**	**80500**	**82500**	**85500**	**85500**	**85500**
Grass Total		**387000**	**459000**	**527000**	**594000**	**671500**	**752000**	**834500**	**920000**	**1005500**	**1091000**

Source: field survey

Table 4 outlines the itemized cost components of areca nut cultivation over a 10-year period. It highlights how capital investment is front-loaded, with returns and profitability improving after the initial years. Constant at ₹20,000/year; used for cost accounting even if land is self-owned. Land Preparation cost Highest in Year 1 (₹25,000), then reduced to ₹10,000/year as ongoing maintenance. Planting Material cost High in Year 1 (₹25,000), minimal in Years 2–3; nil thereafter. For Infrastructure One-time investment in Year 1: ₹2,00,000 for borewell, fencing, etc. Irrigation (Drip/Sprinkler) cost is ₹25,000 in Year 1; ₹5,000–₹6,000 annually from Year 2 onward. Labor cost is ₹25,000 in Year 1; stabilized between ₹8,000–₹10,000/year in subsequent

Gayathri B A, Ramananda M S (2026). *An Analysis of Cost and Profitability of Arecanut Cultivation in Shivamogga District at Karnataka. International Journal of Multidisciplinary Research & Reviews, 5(si2). 12-23.*

years. Depreciation cost Starts in Year 2 at ₹5,000/year for infrastructure and equipment. Fertilization & Manure cost Higher in Year 1 (₹50,000 + ₹10,000); steady increases in later years (₹15,000/year). Plant Protection Chemicals cost Gradual rise from ₹3,000 to ₹5,000/year. Minor transport cost rises from ₹1,000 to ₹2,500 as production begins. Total Cumulative Cost (10 years) ₹10.91 lakh per acre.

Table 5: Average Cost and Profit of Cultivation of Arecanut Cultivation per Acre in Study Area.

Years	Cost of Cultivation	Return for Cultivation			Gross Cost	Gross Profit	Break-Even Point (BEP)
		Yield	Price	Income			
1.	387000	-	5000	-		-	-387000
2.	72000	-	5000	-	459000	-	-459000
3.	68000	-	5000	-	527000	-	-527000
4.	67000	-	5000	-	594000	-	-594000
5.	77500	-	5000	-	671500	-	-671500
6.	80500	15	5000	75000	752000	75000	-677000
7.	82500	30	5000	150000	834500	225000	-609500
8.	85500	50	5000	250000	920000	475000	-445000
9.	85500	60	5000	300000	1005500	775000	-230500
10.	85500	70	5000	350000	**1091000**	**1125000**	**34000**

Source: field survey

Gayathri B A, Ramananda M S (2026). *An Analysis of Cost and Profitability of Arecanut Cultivation in Shivamogga District at Karnataka. International Journal of Multidisciplinary Research & Reviews, 5(si2). 12-23.*

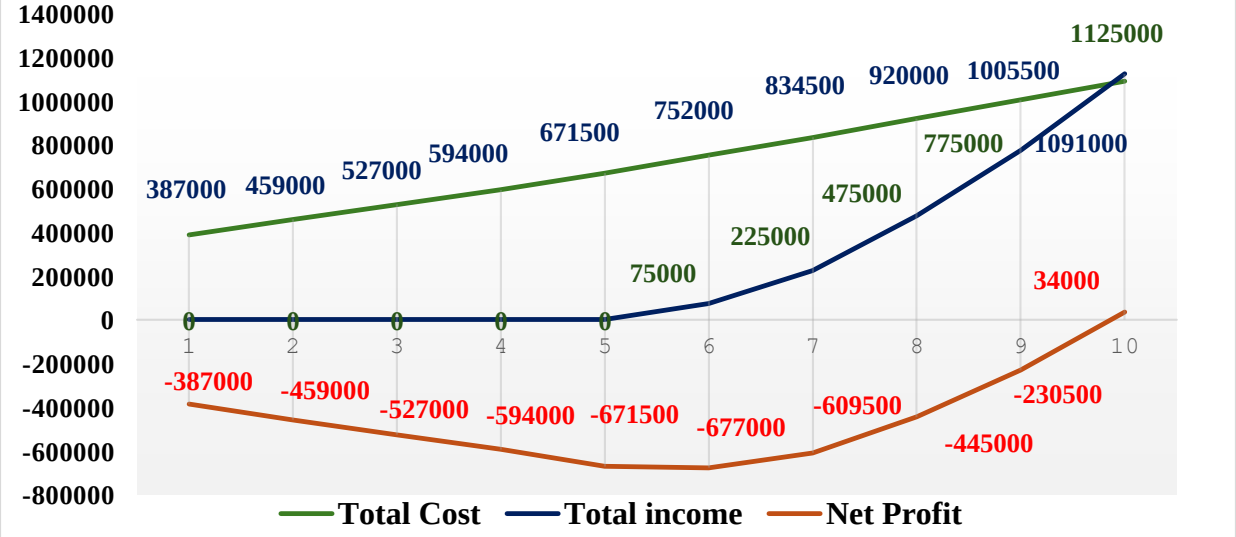

Chart 1: Average Cost and Profit of Cultivation of Arecanut Cultivation per Acre in Study Area

Table 5, chart 1 shows that This table presents a 10-year financial overview of areca nut cultivation, detailing the cost of cultivation, yield, income, gross cost, gross profit, and break-even point (BEP) progression. High Initial Investment ₹3.87 lakh in Year 1, with consistent annual costs around ₹70,000–₹85,000 until maturity. No Returns for First 5 Years Areca nut plants take ~5 years to start yielding, making early years financially negative.Typically, 7–8 years due to the long gestation period before full yield. Break-Even Achieved in Year 10 the cumulative investment is recovered with a small net positive of ₹34,000 in Year 10. Cumulative Gross Income by Year 10: ₹10.91 lakh and Gross Profit (Year 6–10): ₹26.50 lakh. Areca nut cultivation is a long-gestation, high-investment crop that becomes profitable only after 9–10 years. Sustained management, adequate funding, and disease control are crucial for success.

Hypothesis Testing

Hypothesis 1: There is a significant negative corelation between area in cultivation and cost of cultivation of arecanut cultivation in study area.

Parameter	**Value**
Sample size (n)	60
Average size of area in Cultivation	3.168333
Average Cost of Cultivation	1091000
Pearson correlation coefficient (r)	**-0.5834**
r^2	0.3404

Gayathri B A, Ramananda M S (2026). *An Analysis of Cost and Profitability of Arecanut Cultivation in Shivamogga District at Karnataka. International Journal of Multidisciplinary Research & Reviews, 5(si2). 12-23.*

P-value	9.985e-7
Covariance	-154933.1632

Results of the Pearson correlation indicated that there is a significant large negative relationship between Area in Cultivation and Average Cost of Cultivation,

(r (58) = .583, p < .001).

Since the p-value < α,

H_0 is rejected.

The population's correlation is considered to be not equal to the expected correlation. There is a negative corelation between area in cultivation and cost of cultivation of arecanut cultivation in study area.

Hypothesis 2: There is a significant positive corelation between area in cultivation and income earning capacity from arecanut cultivation in study area.

Parameter	**Value**
Sample size (n)	60
Average size of area in Cultivation	3.168333
Average Income from Arecanut cultivation	10884792
Pearson correlation coefficient (r)	**0.8249**
r^2	0.6804
P-value	4.441e-16
Covariance	161352.4011

Results of the pearson correlation indicated that there is a significant large positive relationship between area in cultivation and average income from arecanut cultivation,

(r (58) = .825, p < .001).

Since the p-value < α,

H_0 is rejected.

The population's correlation is considered to be not equal to the expected correlation. There is a significant positive corelation between area in cultivation and income earning capacity from arecanut cultivation in study area.

6. CONCLUSION

Areca nut (betel nut) is a major commercial crop in the Shivamogga district of Karnataka. The region's favorable agro-climatic conditions support its cultivation, making it a significant income source for farmers. Shivamogga district in Karnataka is a major arecanut-producing region, with an increasing area under cultivation. The results of the study show that the total cost incurred for the establishment of a one-acre arecanut cultivation was 1091000. This figure includes expenses for land preparation, planting, planting material, fencing, and other initial costs. The annual

maintenance cost including rental value of owned land was 85500 after 6 years. The gross income and cost obtained from the one-acre arecanut cultivation were 1125000 and 1091000 respectively from 10 Years. After 10 years, overall total cost incurred per acre was 85500 for matured plants. The gross and net returns obtained from the one-acre arecanut cultivation were 350000 and 2,65,000 respectively in current year. However, it can also be found that there is a negative corelation between area in cultivation and cost of cultivation of arecanut cultivation and there is a significant positive corelation between area in cultivation and income earning capacity from arecanut cultivation in study area.

7. AUTHOR(S) CONTRIBUTION

The writers affirm that they have no connections to, or engagement with, any group or body that provides financial or non-financial assistance for the topics or resources covered in this manuscript.

8. CONFLICTS OF INTEREST

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

9. PLAGIARISM POLICY

All authors declare that any kind of violation of plagiarism, copyright and ethical matters will take care by all authors. Journal and editors are not liable for aforesaid matters.

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