

ACADEMICIA: An International Multidisciplinary Research Journal

ISSN: 2249-7137 Vol. 14, Issue 11, November, 2024 SJIF 2022 = 8.252

A peer reviewed journal

ACADEMICIA

ISSN (online) : 2249-7137

ACADEMICIA

An International
Multidisciplinary Research
Journal



Published by

South Asian Academic Research Journals

A Publication of CDL College of Education, Jagadhri

(Affiliated to Kurukshetra University, Kurukshetra, India)

ACADEMICIA

An International Multidisciplinary Research Journal

ISSN (online) : 2249 –7137

Editor-in-Chief : Dr. B.S. Rai

Impact Factor : SJIF 2022 = 8.252

Frequency : Monthly

Country : India

Language : English

Start Year : 2011

Indexed/ Abstracted : Scientific Journal Impact Factor (SJIF2022 - 8.252), Google Scholar, CNKI Scholar, EBSCO Discovery, Summon (ProQuest), Primo and Primo Central, I2OR, ESJI, IJIF, DRJI, Indian Science and ISRA-JIF and Global Impact Factor 2019 - 0.682

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VISION

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EXAMINING THE REVENUE AND EXPENDITURE TRENDS OF MAHARASHTRA STATE: A BUDGET OVERVIEW

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DOI: 10.5958/2249-7137.2024.00017.1

ABSTRACT:

In 2022-23, Maharashtra state was the first state in the country in gross domestic product, and its income was 435 billion USD. The Maharashtra state government has launched many welfare schemes for the people, such as the LadkiBahinYojana, free bus travel for senior citizens, half-ticket ST travel for women, a farmers' loan waiver, and free education for girl students, and for this, the government's revenue expenditure has increased to a large extent. That is why in this research paper I have studied how the total receipts and total expenditure of the government, the total revenue receipts and total revenue expenditure of the government, and the total capital receipts and capital expenditure of the government have changed from 2014-15 to 2024-25. Also, this research paper has suggested what revenue and capital measures the Maharashtra state government needs to take to achieve its economic development in the future.

KEYWORDS: Maharashtra, Receipts, Expenditure.

I) INTRODUCTION:

India is known as one of the largest developing countries in the world. Presently there are 28 states and 8 Union Territories in India. India's current target for GDP growth in the next five years is to bring India to the third position in the world, and Maharashtra state is going to play a huge role in this. The state of Maharashtra was established on 1st May 1960, and, since then, Maharashtra has achieved very rapid development. Maharashtra is seen as the largest economy in India. In the year 2022-23, G. S. D. P. (Gross State Domestic Product) income stood at 435 USD billion. Maharashtra is seen as an important state among the commercial and industrial hubs, which is why it is also called the gateway to India. Maharashtra's share in India's total gross domestic product is around 14%. The growth rate of Maharashtra in the year 2022-23 is 9.4%, and in the year 2023-24 it is 7.6%. That is why Maharashtra is a state that is taking steps in terms of development. So, in this research paper, I have analyzed the financial system of Maharashtra state. In this paper, I have given special attention to Maharashtra's total revenue, total expenditure, revenue receipts, revenue expenditure, capital receipts, and capital expenditure. It also explains what measures can be taken to increase the income and development of Maharashtra.

II) Statement of Problem:

India's per capita income in 2023-24 is Rs 184,000, while at the same time, Maharashtra's per capita income was Rs 252,389 in 2023-24, and it increased to Rs 277,603 in 2023-24. In the year 2024-25, 52.46% of the total foreign investment in the world was invested in Maharashtra alone. Networks of sugar factories, milk cooperatives, cooperative banks, and educational institutions are scattered all over Maharashtra. As per NitiAayog Multi-Dimensional Poverty Indicators in 2023-24, 14.96% of people in India were living below the poverty line, while only 7.8% of the people in Maharashtra were living below the poverty line, which proves that Maharashtra is a developing state compared to other states in India. But currently the government is announcing many popular schemes in Maharashtra, like Chief Minister LadkiBahinYojana, Shetkari Jan SanmanYojana, Overdue Electricity Bill Waiver Yojana, and Salary Increase for ST Corporation, etc. Also, the objective is to make Maharashtra a 1 trillion dollar economy by 2028, and therefore the budget of Maharashtra is intended to be studied. So, in this research paper, I have studied the total income of Maharashtra, expenditure incurred by Maharashtra, revenue income and revenue expenditure of the government, capital income, and capital expenditure of the government. In this research paper I have included what measures can be taken by the government to increase its revenue.

II) Objectives of the Study:

- 1) To study the fiscal position of the Maharashtra State.
- 2) To suggest certain remedies to increase revenue receipts for Maharashtra State.

IV) Data Base and Research Methodology:

The present research study is a unique attempt to examine the growth and revenue significance of taxation with reference to Maharashtra state during the period from 2014-15 to 2024-25. The study also tries to identify the problems relating to Maharashtra State taxation and possible remedies for the same. This study is based on secondary data. The necessary secondary data has been collected from the publications of Maharashtra State Budgets, like annual budgets, economic surveys from 2014-15 to 2023-24, Comptroller and Auditor General of India Reports, annual reports, booklets, official records, and all others. The publications by the Government of Maharashtra and the Union Government of India have also been considered and used in accordance with the needs and requirements of the study. The tabulated data is analyzed by employing necessary statistical tools like mean, coefficient of variation, compound growth rate, and others. The analysis of the data is carried out using computer software packages like Excel and SPSS. Likewise, graphical presentation has also been attempted to show trends in some important variables.

V) Review of Literature:

In this literature, an attempt is made to review the important studies on the taxation and finances of Maharashtra state.

Mukesh Anand, Ravindra Jha (2004) have studied 'Budgetary subsidies and the fiscal deficit case of Maharashtra.' In this paper they have studied the Government of India providing subsidies in Maharashtra. In this paper they explore the reasons for the wide gaps in the measures of fiscal deficit and estimate of aggregate subsidy and suggest an improvement in the methodology to estimate the letter. In this paper they have elucidated the economic rationale for

subsidies and the need to study their impact as a significant policy tool. In this research they lastly conclude by emphasizing the need for reconciliation between the fiscal deficit and aggregate subsidy estimation.

Abhay Pethe, Mala Lalvani (2010), has studied the fiscal situation in Maharashtra and assessment a critic and some policy suggestions'. In this paper they have been focusing on Maharashtra state fiscal problems being faced at the level of state governments. In this paper they studied a brief overview of the economic environment in Maharashtra, including the socio-economic development of the state as a backdrop. In this paper they studied the bottleneck to the growth of Maharashtra's economy, thereby adding to the fiscal woes of the state. In this paper, it attempts to understand the fiscal problems being confronted at the level of state governments with the state of Maharashtra.

Sanjay Rode (2010), studied the 'Fiscal Regulation and Expenditure Pattern in Maharashtra State.' In this paper he explains the states' performance in terms of deficits. In this paper he focused on the revenue and capital expenditure pattern of Maharashtra state. In this research paper, he explains the regression results of his own tax revenue and the effects of the FRBM act on the development and non-development expenditure pattern of Maharashtra state. In this paper's last section he explains the conclusion and policy implications of Maharashtra State.

Ashok Lahiri, R KavitaRao, MukeshAnand (2001) studied the 'Study of Maharashtra finances.' In this paper they studied the deficit and debt situation of Maharashtra state. In this paper they explained that Maharashtra revenue receipts, public sector enterprises, and forecasts of receipts and expenditures of Maharashtra state. In this paper they highlighted tax policy and administration and possible measures for reforms for Maharashtra state. In this working paper they analyzed the growth performance and sector profile in India's various states.

Deshmukh Mahadev S. (2012) studied the 'Economic analysis of VAT and revenue growth in Maharashtra. In this paper he analyzed the economic impact of VAT on revenue growth and efficiency in Maharashtra. He studied in this research paper what trends are in VAT in Maharashtra. In this research paper he focuses on finding the contributions of major districts of Maharashtra to the total tax revenue of the state. In the last section of this research paper, he explains the policy measures to improve the efficiency of the tax system.

VI) Maharashtra State Budgetary Position:

The budget of the Maharashtra state is divided into two accounts, viz.

1. The Revenue Account 2. The Capital Account

Revenue Account:

The revenue account shares revenue receipts from additional taxation and non-tax revenue surplus from public enterprises, balance from the current revenue account, etc. It also shares revenue expenditure on various current items of expenditure, such as development and non-developmental heads.

Capital Account:

The capital accounts Shows capital receipts and capital expenditure. Capital receipts included liabilities from market borrowings, small savings, other capital receipts, and external borrowings.

Capital expenditure includes repayment of debts and expenditure incurred on construction of durable capital assets. The budget gives.

I) The actual for the year preceding.

II) Revised figures for the current year and

III) Budget estimates or receipts and expenditure for the ensuing year (Mankar V.G., 1992, pp. 508-509)

Concept of Deficit Finance –

Deficit financing has emerged as an important tool for financing the government's expenditure. When the total estimated expenditure exceeds the aggregate estimated receipts during a year, the gap between the two is to be called deficit financing.

Definition of Deficit Financing –

Deficit financing thus refers to the financing of the excess expenditure over the total revenue receipts of the government. During the year by various methods.

$$\text{Deficit Financing} = \frac{\text{Total Public Expenditure}}{\text{Total Public Revenue}}$$

Deficit Financing in Developed Countries –

In developed countries, the total revenue receipts include tax and no-tax revenue and exclude all borrowings. That means deficit financing in developed countries refers to the financing of expenditure through borrowings, whether internal or external, and whether from the central bank, commercial banks, non-banking institutions, or from individuals and corporations.

Deficit Financing Concept in India -

In India, however, the concept of deficit financing has a specific meaning different from what is described above for developed countries. It refers to the financing of the deficit in the aggregate expenditure through advances from the Reserve Bank of India only. In other words, it refers to the financing of the deficit in the budget through the creation of new money by the RBI.

The fundamental difference between the concept of deficit financing between the developed countries like the USA, UK, France, etc., and India is that whereas for the former, all borrowings as described above are referred to as deficit financing, in India only borrowings from the Reserve Bank of India. (i.e., the creation of new money) and the accumulated balance of the Government of India are termed as deficit financing; other borrowings, that is, loans from non-banking financial institutions and from individuals and corporations (market loans), are included in the receipts of the government.

Thus for India.

$$\text{Deficit Financing} = \text{Aggregate Public Expenditure} - (\text{Tax Revenue} + \text{Non-Tax Revenue} + \text{Borrowing from all sources except advances from the Reserve Bank of India.})$$

The concept of deficit financing is explained very clearly by the planning commission of India in the first five-year plan in the following words.

The term deficit financing is used to denote the direct addition to gross national expenditure through budget deficits, whether the deficits are on revenue or capital accounts. It implies that the expenditure of the government over and above the aggregate recent revenue account and capital account is treated as a deficit of the govt. Thus borrowings from the general public and commercial banks and income from state enterprises, etc., would be treated as the receipts of the capital account. The government may cover this deficit either by running down its accumulated balances or by borrowing from the banking system (mainly from the central bank of the country and thus creating money) (Mankar V.G. 1992, pp. 195-196).

Dr. V. K. R. V. Rao has defined deficit financing as the financing of a deliberately created gap between public revenue and public expenditure, the method of financing resorted to being borrowing of a type that results in a net addition to national outlay or aggregate expenditure. Hence, in simple words, deficit financing can be defined as the excess of expenditure over and above the government's total income. Therefore, the method of deficit financing results in a net addition of national outlays or aggregate expenditure. (Tyagi B.P. 1970, p. 315) Thus, as a result of deficit financing, there is always a net increase in the public expenditure.

In India, the tool of deficit financing is used by the central government as well as the state government. The budgetary deficit of the central and state governments is measured as

Central government deficit = net increase in the holding of treasury bills and change in cash balance.

State government deficit = Net credit under ways and means advances and change in their cash balance.

Total deficit of the economy = Central government deficit + State government deficit (Shelar R.D., 1992, p. 54)

There are three important techniques through which the govt. may finance its budgetary deficits. They are as follows:

Borrowing from the central bank, i.e., the creation of new money. The running down of accumulated cash balance. It implies the withering away of the central bank to finance a budgetary deficit. The govt. may issue new currency.

It is thus obvious that all these methods lead to an increase the supply of money. To put it in the words of R. N. Tipathi, "Thus deficit financing by the government for filling up the gap in its investment budget would result mainly in an outright expansion of currency." (Tyagi B.P., 1970, p. 316)

Measures of deficit financing –

There are five concepts or measures of deficit financing in India, namely.

- A) Budgetary Deficit
- B) Revenue Deficit
- C) Monetized Deficit

D) Fiscal Deficit

E) Primary Deficit

Besides this, the deficit on the capital account of the government budget is also one of the deficit measures.

Budgetary Deficit:

The difference between all receipts and expenditure on both revenue and capital accounts is a budgetary deficit. It is the excess of total expenditure over total receipts. It was this budgetary deficit, which was called deficit financing by the government of India. It indicates the extent of the shortage of total revenue compared to the total expenditure. (Korabu R.G., 2009, p. 29) Budgetary deficits when accrued for a very long span of time, say for several decades or centuries are termed as government debts. Under such circumstances, a certain portion of the governmental expenditure is then utilized for repayment of such debts, with some maturity. This maturity is capable of being refinanced through the issuance of fresh bonds on a governmental level. However, it must be noted that while a budget deficit is considered to be a flow, a government debt amounts to a stock. In fact, government debts are nothing but an accrued flow of budget deficits.

The definition of a budgetary deficit essentially evolves from that of government debt. When governmental debt is defined as the total amount owned by somebody, budget deficit refers to the amount by which savings enhance or a governmental debt develops. In fact, a practical example will clearly reveal the relationship existing between budget deficit and governmental debt. A budgetary deficit is the difference between all receipts and expenditures of the government, both revenue and capital. This difference is met by the net addition of the treasury bills issued by the RBI and drawing down of cash balances kept with the RBI. The budgetary deficit was called deficit financing by the government of India. This deficit adds to the money supply in the economy, and therefore, it can be a major cause of inflationary rises in prices. (<http://www.kalyan.city.blogspot.com>)

B) Revenue Deficit:

The revenue deficit denotes the difference between revenue receipts and revenue expenditure. It is the excess of revenue expenditure over revenue receipts of the government. This concept indicates that the failure of the government to meet revenue expenditure with the revenue receipts and dependence of the government on others to meet expenditure required for providing current services. (Korabu R.G, 2009, p-28)

Definition of 'Revenue Deficit': when the net amount received (revenues less expenditures) falls short of the projected net amount to be received. This occurs when the actual amount of revenue received and/or the actual amount of expenditures do not correspond with predicted revenue and expenditure figures. This is the opposite of a revenue surplus, which occurs when the actual amount exceeds the projected amount, explains 'Revenue Deficit.' For example, consider an organization with budgeted revenue of Rs 325,000 Lakh and budgeted expenditures of \$200,000, which equates to a net amount of Rs.125, 000 Lakh. During the fiscal year, the organization's total revenue is actually Rs. 300,000 lakh, while its total expenditure is Rs 195,000 lakh. The net amount received by the organization is Rs. 105,000 lakh, which is Rs. 20,000 lakh less than the projected receipt of Rs. 125,000 lakh. Therefore, although the organization generated a positive

net amount of proceeds, it fell short of the projected amount, creating a revenue deficit. (Raval S.K., 2015, p. 53)

VII. Fiscal Position of Maharashtra State:

Overall fiscal position shows the nature and extent of surplus or deficit of the government working at any level. It enables us to examine the trends in the surplus or deficit and suggest measures on the problem of the deficit. On this background, an attempt has been made to examine the overall fiscal position of Maharashtra State during the period from 2014-15 to 2024-25. If it is an indicator of the success or failure of the government in collecting the necessary revenue to meet its duties and responsibilities. It is surplus on overall budgeting revenue more than necessary, but when it is in deficit, that it is an indicator of the failure of the government in the mobilizing of the necessary revenue as well as control of its growing expenditure. The overall budgetary position of Maharashtra state is given in Table 1.

Table No. 1 Overall Budgetary Position of Maharashtra State (Rupees in Crore)

Year	Total Revenue	% share	Total Expenditure	% share	Surpluses / Deficit
2014-15	218427	-0.30	219075	-0.30	-648
2015-16	237137	-0.08	237327	-0.08	-190
2016-17	270585	-0.32	271449	-0.32	-864
2017-18	268735	-0.24	269393	-0.24	-658
2018-19	372492	-0.20	373235	-0.20	-743
2019-20	338690.64	0	338690.64	0	0
2020-21	335636	-2.09	342638	-2.04	-7002
2021-22	406369	1.86	398792	1.90	7577
2022-23	461151	-2.77	473922	-2.69	-12771
2023-24	516879.93	0.96	511905.78	0.97	4974.15
2024-25	600521	1.25	593034.21	1.26	7486.79
CGR	10.01		9.94		
C.V.	31.59		31.15		
Mean	366056.69		366314.69		

Sources: Budgetary documents of Maharashtra State

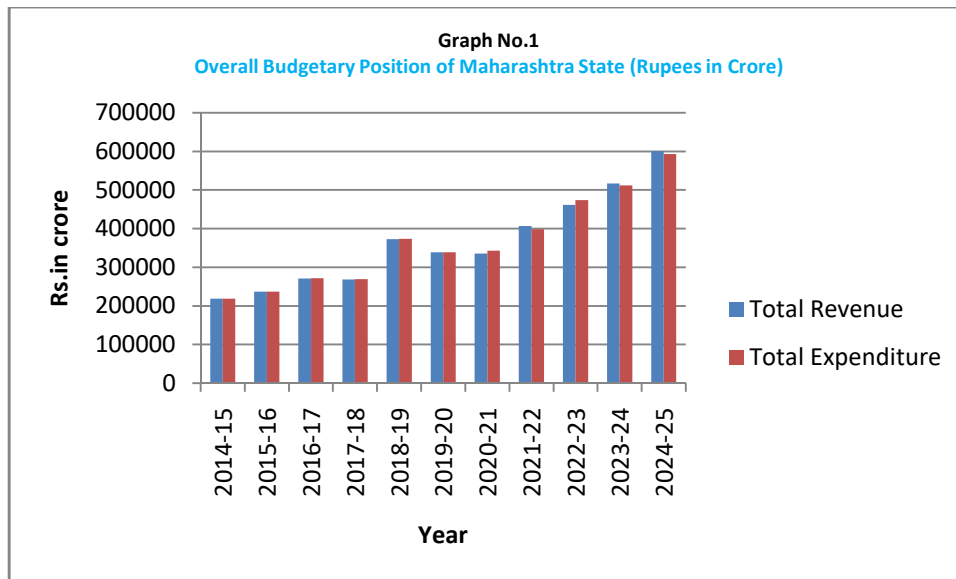


Table No. 1 presents the total revenue, total expenditure, and overall budgetary position, namely deficit or surplus. The CGR (Compound Growth Rate) of Total Revenue is 10.01% per annum, and the CGR of Total Expenditure is 9.94%. The years 2019-20, 2021-22, 2023-24, and 2024-25 are indicating that there was a budgetary surplus, and in other years, the budget was a deficit. But the deficit is very high in the year 2022-23. The share of surplus or deficit in total revenue and total expenditure shows the influence on both. The overall income of Maharashtra state was Rs. 218427 crore in 2014-15, which increased to Rs. 600521 crore in 2024-25. The data analysis tells us that the minimum and maximum values of total revenue were Rs. 218427 crore and Rs. 600521 crore, respectively, and its mean is Rs. 366056.69 crore.

From the table, total expenditure of Maharashtra state increased rapidly from Rs. 219075 crore in 2014-15 to Rs. 373235 crore in 2018-19 and further to Rs. 593034.21 crore in 2024-25, registering a growth of 8 times.

From the data in column no. 3, the Maharashtra state persistently had a prescribed deficit during 2014-15 to 2024-25, except for 4 years. The deficit was highest in 2022-23, which amounted to Rs.12771 crore, and it was lowest in 2015-16, which was worth Rs.190 crore.

The state experienced a surplus in the budget 4 times in 11 years. The period under our review, which was worth Rs. 7577 crore, was the highest in 2021-22. It was lowest in 2023-24, which was worth Rs. 4974 crore.

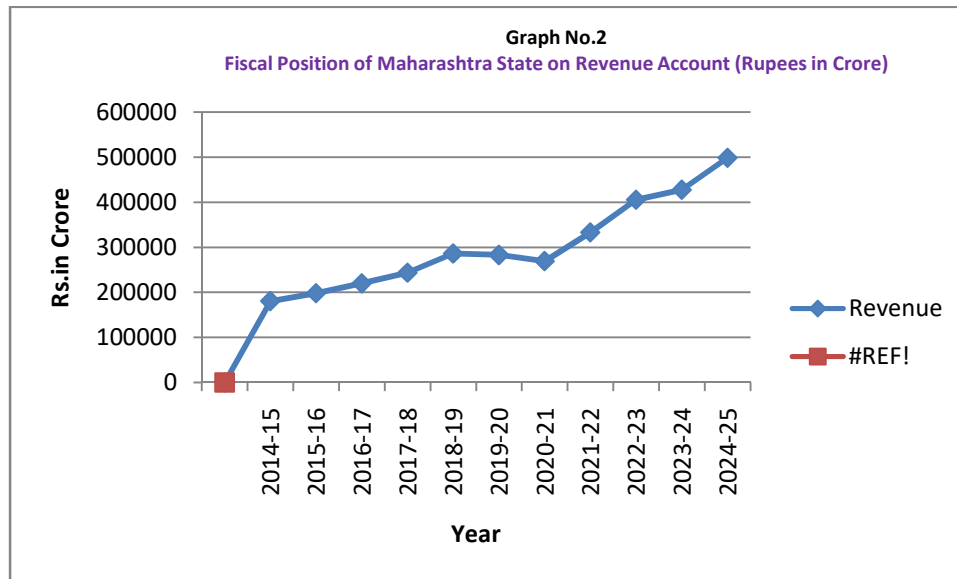
Fiscal Position of Maharashtra State on Revenue Account:

In the revenue account, we consider the revenue receipts, mobilization, and expenditure activities, as well as the differences in both. Here we consider the percentage share of deficit in the revenue receipts as well as revenue expenditure. A fiscal operation of the Maharashtra state on revenue account has a special importance from the point of view of discharging of duties and responsibilities of the Maharashtra State as well as providing various services and facilities to the citizens at present. The surplus or deficit on the revenue account indicates the attempts and success or failure of the Maharashtra state in mobilizing revenue account receipts and spending activities to the account.

Table No. 2 Fiscal Position of Maharashtra State on Revenue Account (Rupees in Crore)

Year	Revenue Receipts	% share	Revenue Expenditure	% share	Surpluses / Deficit
2014-15	180794	-7.68	194677	-7.13	-13883
2015-16	198321	-4.68	207611	-4.47	-9290
2016-17	220012	-6.54	234390	-6.13	-14378
2017-18	243654	0.85	241571	0.86	2083
2018-19	286500	-5.22	301460	-4.96	-14960
2019-20	283189.58	-6.04	300305.21	-5.70	-17115.63
2020-21	269468	-15.27	310610	-13.25	-41142
2021-22	333312	-4.91	349686	-4.68	-16374
2022-23	405678	-0.48	407614	-0.47	-1936
2023-24	427964.81	-2.70	439529.47	-2.63	-11564.66
2024-25	498758.12	-1.96	508491.88	-1.91	-9733.76
CGR	10.08		9.75		
C.V.	31.87		30.14		
Mean	304331.96		317813.23		

Sources: Budgetary documents of Maharashtra State



The revenue account position of Maharashtra state is given in table 2. The overall revenue receipts of Maharashtra state were Rs. 180794 crore in 2014-15. They increased to 498,758.12 croreRs. in 2024-25, registering an overall increase of 10.08% (C.G.R.) over a period of 11 years. Thus, during 2014-15 to 2024-25, revenue receipts C.V. is 31.87. While analysing descriptive statistics in the case of revenue receipts, it ranged between Rs. 498758.12 crore maximum and Rs. 180794 crore minimum, with a mean of Rs. 304331.96 crore.

The Maharashtra state 2014-15 percentage share of surplus/deficit to revenue receipts is shown in the column as -7.68, and to revenue expenditure it was -7.13. It means the share of surplus revenue expenditure is surplus to high compared to revenue receipts. In 2014-15, the percentage

share of surplus to revenue receipts is -7.68% and the revenue expenditure share is -7.31%, which means the revenue expenditure share is high compared to revenue receipts. During 2014-15 to 2024-25, i.e., 11 years, the share of supply to revenue expenditure share is high compared to the share to revenue receipts.

The above data analysis regarding the overall fiscal position of SMKMC on the revenue account reveals the following conclusion.

The revenue receipts and revenue expenditure of the state of Maharashtra have been increasing every year. The main feature of the revenue account is that the state of Maharashtra has faced the problem of deficit for 10 out of 11 years. In 11 years, revenue expenditure has been 10 times more than revenue receipts, and that is why it is very important for Maharashtra to increase revenue receipts.

During the period under study, the revenue account of Maharashtra has always been in deficit. Maharashtra has not been able to control revenue expenditure. Therefore, the state of Maharashtra has had to meet the revenue account expenditure from capital receipts, and this is not suitable in the long run. The gap between revenue expenditure and revenue receipts has remained higher. Therefore, Maharashtra needs to make efforts to increase its revenue income.

Fiscal Position of Maharashtra State on Capital Account

Capital transactions of the Maharashtra state are very important because they are concerned with the socio-economic development of the economy it represents. They create and promote potentialities of socio-economic development of the country. They are also useful in promoting the size and rate of economic growth of the economy. Hence it is essential to examine the financial transactions of the Maharashtra state on capital account.

The following table No. 3 presents the financial position of Maharashtra state on the capital account. A capital account transaction of the government consists of capital receipts collection and capital expenditure activities and the position of surplus or deficit.

Table No. 3 Fiscal Position of Maharashtra State on Capital Account (Rupees in Crore)

Year	Capital Receipts	% share	Capital Expenditure	% share	Surpluses / Deficit
2014-15	37633	35.17	24398	54.25	13235
2015-16	38816	23.44	29716	30.62	9100
2016-17	50575	26.72	37059	36.47	13516
2017-18	25082	-10.92	27821	-9.81	-2739
2018-19	85992	16.53	71775	19.81	14217
2019-20	55501.06	30.84	38385.43	44.59	17115.63
2020-21	66168	51.59	32029	106.59	34139
2021-22	73058	32.78	49106	48.78	23952
2022-23	55473	-19.53	66308	-16.34	-10835
2023-24	88915.12	18.60	72376.31	22.85	16538.81
2024-25	101763.56	16.92	84542.33	20.37	17221.23
CGR	9.96		11.37		
C.V.	36.97		42.14		
Mean	61725.16		48501.46		

Sources: Budgetary documents of Maharashtra State

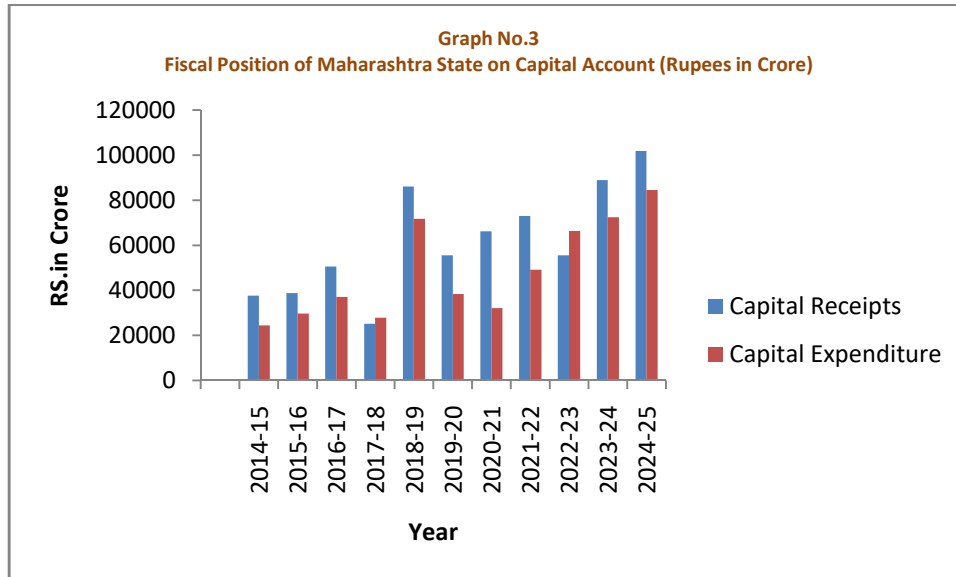


Table No. 3 indicates that there was a surplus on the capital account during 2014-15 to 2024-25 except in 2017-18 and 2022-23. The C.G.R. was 9.96% and 11.37% in the case of capital receipts and capital expenditure, respectively. . In the same period, capital receipts C.V. is 36.97, and capital expenditure C.V. is 41.14. The data results tell us that the minimum and maximum values of capital receipts were Rs. 25082 crore and Rs. 101763.56 crore, respectively, and the mean was Rs. 61725.16 crore. The minimum and maximum values of capital expenditure were Rs. 24398 crore and Rs. 84542.33 crore, respectively, and the mean was Rs. 48501.46 lakh. The overall capital receipts of the state were Rs. 37633 crore in 2014-15 and increased to Rs. 101763.56 crore in 2024-25, by registering an overall growth of Rs. 64130.56 crore over a period of 11 years. The state share of surplus/deficit to capital receipts percentage in the column is 35.17%, and the capital expenditure percentage is 54.25%, which means capital expenditure is low compared to the share to capital receipts. Its share in 2024-25, percentage share of surplus/deficit to capital receipts, is 16.92, and to capital expenditure is 20.37, meaning the share to capital expenditure is high compared to capital receipts. During 2014-15 to 2024-25, over 11 years, on the capital account of Maharashtra state, the share of surplus/deficit to capital revenue is high compared to capital expenditure.

The above data analysis about fiscal position of Maharashtra state on the capital account gives the following conclusion.

In 11 years, the capital receipts of the state of Maharashtra increased, but the increase was not significant, but the capital receipts are much higher than the expenditure. Capital expenditure is relatively low, and hence it is clear that revenue is spent from the remaining capital receipts.

It is observed that capital receipts are of great importance for the state of Maharashtra to achieve long-term development of its sector. The capital receipts of the state of Maharashtra have increased during the period 2014-15 to 2024-25, but there is a need to increase them further. The capital receipts of the state of Maharashtra are high, and the capital expenditure is relatively

low, and this is commendable for the state of Maharashtra. It is necessary to increase capital receipts to meet the needs of the people in the future.

VIII. Findings:

1. It is found that total revenue and total expenditure have increased by 10.01 and 9.94 percent per annum, respectively, during the period under study.
2. It is found that the overall fiscal position of Maharashtra State is not satisfactory, and it has failed to control the overall deficit by about 5% during the entire period under study.
3. It is found that total revenue and total expenditure C.V. were 31.59 and 31.15 percent during the period under study.
4. It is found that revenue receipts and revenue expenditure have increased, respectively, 10.08 and 9.75 percent per annum during the period under study.
5. It is found that revenue receipts and revenue expenditure C.V. were 31.87 and 30.14 percent during the period under study.
6. It is found that the revenue account of Maharashtra has always been in deficit. Maharashtra has not been able to control revenue expenditure.
7. It has been found that the revenue receipts of Maharashtra have been facing a deficit problem for 10 out of 11 years. In 11 years, revenue expenditure has been 10 times higher than revenue receipts.
8. It is found that capital receipts and capital expenditure have increased, respectively, 9.96 and 11.37 percent per annum during the period under study.
9. It is found that capital receipts and capital expenditure C.V. were 36.97 and 42.14 percent during the period under study.
10. It is found that the capital receipts of the state of Maharashtra are high and the capital expenditure is relatively low, and this is commendable for the state of Maharashtra.

IX. Suggestions:

1. Maharashtra state should endeavor to increase the importance of taxation in total revenue as well as revenue receipts collection through efficient collection of the present taxes.
2. The revenue expenditure of the Maharashtra government is more than the revenue collection, so the government needs to focus on increasing revenue collection. For this, different taxes should be introduced. Measures like increasing tax on land purchase and sale, increasing tax on alcoholic beverages, and increasing stamp duty are necessary.
3. The Maharashtra government needs to impose large penalties to curb tax evasion.
4. The Maharashtra government needs to make efforts to increase capital receipts. For this, it is necessary to obtain additional funds through various shares and debt securities.
5. The Maharashtra government needs to make efforts to obtain all the funds received from the Centre through GST to meet its revenue expenditure, thus increasing the government's revenue income.

6. Among the various schemes launched by the Maharashtra government for the welfare of the people, it is necessary to verify the applications in the LadkiBahin Scheme, which will save the government's expenses.
7. The Maharashtra government needs to reduce the various concessions and subsidies it has provided to increase its revenue, such as a 50% concession in ST for women, free ST travel for senior citizens, etc.
8. The Central Government should give Maharashtra complete autonomy to levy, collect, and fix tax rates.
9. The Maharashtra government needs to promote foreign investment. At the same time, various incentives should be given to new industries so that new industries will emerge, employment will increase, and the government's revenue and capital receipts will increase.

X. CONCLUSIONS:

Maharashtra is known as the financial capital of the country. Maharashtra has a huge share in the country's GST. Maharashtra is a leading state in art, culture, education, healthcare, agriculture, industry, trade, business, and foreign investment. But in recent times, there has been a huge gap between the income and expenditure received by the government in Maharashtra through various means. Also, the mountain of debt on the state of Maharashtra is also increasing, and that is why Maharashtra needs to increase its revenue and capital receipts. It is necessary to generate revenue income through various means to continue public welfare schemes. At the same time, unnecessary subsidies and concessions need to be stopped. It is necessary to promote foreign investment and industries for the development of the state. For this, efforts need to be made to get funds from the central government, and it is also necessary to give them various concessions to attract foreign investment. If we want to have a one trillion US dollar economy in the future, all citizens of the state need to pay taxes and increase their share of government revenue. Everyone needs to contribute to the development of Maharashtra. Therefore, there is no doubt that Maharashtra will become a new, economically, socially, and politically prosperous state in India, and even the number one state in the world.

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BIORESOURCE POTENTIAL OF DUCKWEED IN AQUACULTURE PRACTICES: AN UPDATED BIBLIOMETRIC ANALYSIS THROUGH SCOPUS DATABASE

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DOI:10.5958/2249-7137.2024.00018.8

ABSTRACT

Bioresources are of significance to humans as potential source of raw material, feedstock, for product and energy generation with economic and industrial viability. Duckweed known as 'water lentils', are surface, beneath surface floating plants in fresh and brackish water systems of Lemnaceae family. Duckweeds bestow remarkable bioresource potential to aquaculture practices in terms of sustainable feed, value added production and, energy generation (biofuels) with potential of bioremediation and waste-water treatment. This paper explores bibliometric collection of various works discussing the bioresource potential of duckweed in aquaculture practices. Astute linkages of China, India, US are visualized in terms of publications, citations and total link strength as top three contributors country wise. Organization wise Henan Province Engineering Research Center, China has maximum documents, citations and total linkage. Central themes observed through keywords and title field depict developing trends on the topic.

KEYWORDS: *Duckweed, Fish Feed, Protein Nutrition, Aquaculture, Bibliometric Analysis.*

1. INTRODUCTION

Aquaculture has contributed largely to global food fish produce and is deemed to be one of the largest sources of animal protein of human diet and nutrition. Aquaculture dependence on fish meal (FM), fish oil (FO) accounts 63% and 81% of their global supplies respectively, particularly with respect to valued farmed carnivorous varieties including salmon, sea bass and sea bream (HLPE, 2017; WRI, 2013; Woodgate et al., 2022). Rising cost of aquaculture feed due to

impelled use of FM and FO in diets require search for suitable alternative feed sources that may contribute to sustainable aquaculture growths. Partial or total replacement of FM is plausible with inclusion, chiefly comprising plant ingredients (such as those consisting duckweeds) and insect meal from black soldier fly (BSF) *Hermetia illucens*. Limiting effects of insect meal have been reported due to low n-3 PUFA and low palatability, digestibility owing to high chitin content and posing negative effects on fish growth (Alfiko et al., 2022; Maulu et al., 2022). Terrestrial ingredients such as plant proteins and plant-derived oils (for example- sunflower oil, soybean oil), for aquaculture can pave way for sustainable productions. Plant proteins with protein content and amino acid digestibility similar to fishmeal can minimize economic and environmental footprint (Naylor et al., 2009; Pleić et al., 2022). In this respect plant based alternatives such as duckweeds as non-conventional ingredients in aquaculture feeds offer greater promise. Duckweeds are one of the smallest known, fastest growing aquatic macrophytes with large number of globally distributed species. Known for their incremental growth potential duckweeds contribute to higher biomass production within shorter time span (Appenroth et al., 2013). Duckweeds include four genera namely *Spirodela* commonly called as greater duckweed, *Wolffia* (watermeal), *Wolffiella* (consisting common forms mud-midgets, bogmats) and *Lemna*, with grossly thirty seven (Appenroth et al., 2013) reported species. Duckweeds represent efficient nutrient uptake potential for nitrogen and phosphorous with protein content ranging between 30-45% dry matter (Stadtlander et al., 2023). Moreover, high protein amounts in few strains and alternative growth conditions makes duckweed biomass valuable aquafeed ingredient and as human food for direct consumption (Leng et al., 1995; Xu et al., 2021). At feed inclusion levels between 15-30% positive effects on growth and feed conversion ratio (FCR) have been reported without affecting survival rates of fish (Minich & Michael, 2024). Bioresources are non-fossilized biogenic materials for human use as source of food, feedstock, value added products and energy. Bioresources are the naturally existing renewable and biodegradable materials considered to be sustainable solutions central to bioeconomy (Ingle et al., 2020). Duckweeds bestow remarkable bioresource potential to aquaculture practices in terms of sustainable feed and value added production (biochar, bioplastics, biopolymers), energy generation (biofuels such as bioethanol, biogas), with potential of bioremediation and waste-water treatment (Muradov et al., 2014; Baek et al., 2021; Irabor et al., 2022). Present work specifies bibliometric development in terms of literature growth, funding, documentation, citation, keyword trends, authorwise and organization based linkages to investigate time trending expansions on the theme, with potential of duckweeds in progressing sustainable aquaculture discourse.

2. MATERIALS AND METHODS

2.1 Collation of Bibliometric Information

Bibliometric analysis attempts to provide enhanced understanding of the research backdrop, organization, and interrelationships (NOAA, 2015). Scopus database was searched in 'All fields' tab with input term '*duckweed bioresource in aquaculture*' on date 19/9/2024. Citation report of documents with cumulative h-index and total citations of publications was generated. Bibliography, funding, keyword and abstract information were downloaded in CSV file format for further analysis.

2.2 Bibliometric Data Analysis

Bibliometric data analysis is carried by VOSviewer software (version 1.6.20) for construction and elucidation of bibliometric links. Bibliometric network visualization envisages co-authorship country, author, organizations, keyword co-occurrence and title field analysis.

3. Results and Discussion

3.1 Document Coverage and Citations Analysis

Document coverage accounts information pertaining to publication type, number, authorship, subject area, country, organization and funding sponsors. Citation analysis considers total citations as well as year wise citations received by the published works.

1,524 documents were obtained on the search topic ‘*duckweed bioresource in aquaculture*’ with cumulative h-index of 104 and total citations 52,932. Maximum published documents (n=225) were in the year 2022 followed by 208 works in 2023. Year-wise rising trend in publications show escalation in received citations, with maximum citations documented in 2023 as depicted in Fig.1.

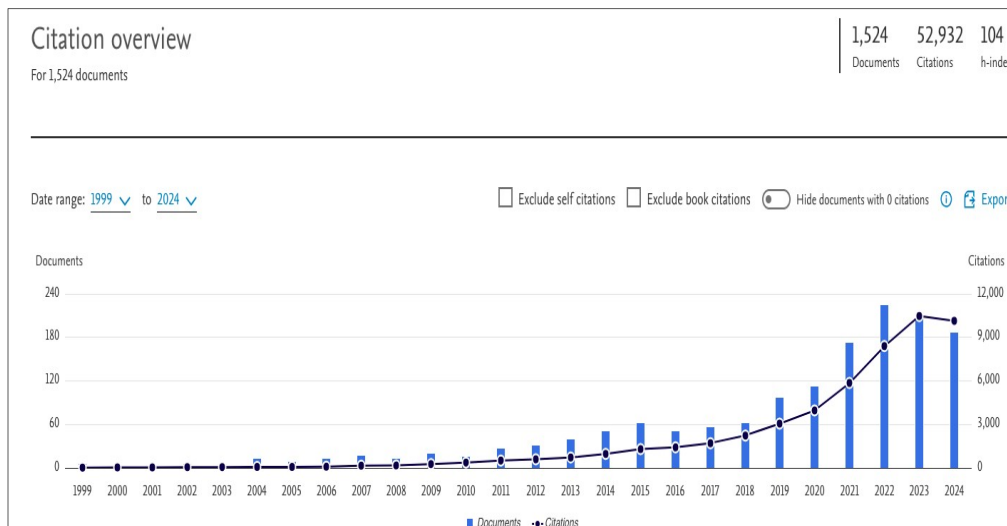


Fig.1. Year-wise document and citation overview (Source: Scopus,2024)

Articles have highest count n= 941 accounting 61.7% of total publication types, followed by review (n= 348, 22.8%), book chapter (n=192, 12.6%), conference paper (n=24, 1.6%) and book (n=19, 1.2%), shown in fig.2.

Top five areas addressing the subject, as shown in Table 1, are environmental science with 29.9% contributions, agricultural and biological sciences (18.6%), engineering (8.4%), energy (6.9%), and chemical engineering (6.9%).

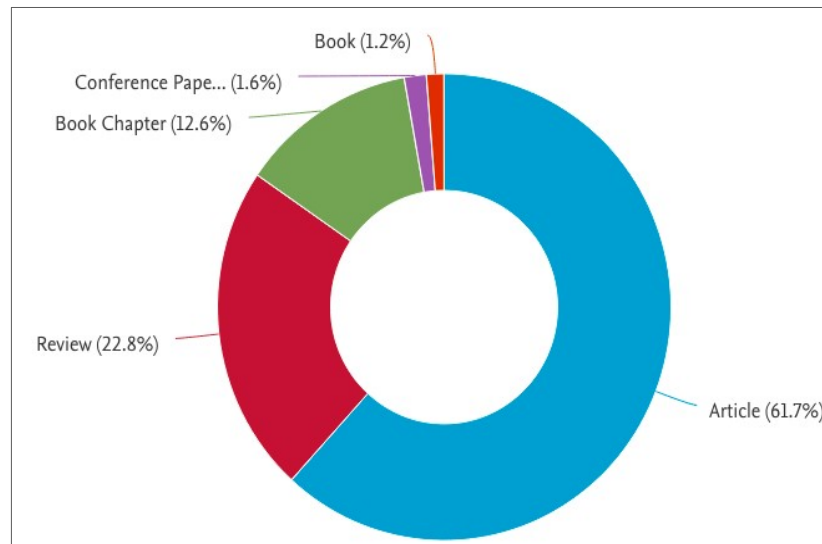


Fig.2.Type of published works on duckweed bioresource in aquaculture (Source: Scopus, 2024)

Table 1: Number of documents in top five subject areas on duckweed bioresource in aquaculture (Source: Scopus, 2024)

Subject Area	No. of documents
Environmental science	889
Agricultural and biological sciences	553
Engineering	251
Energy	206
Chemical engineering	205

Zhao H. is the most prolific author with maximum documented research items, n=19. Fang Y., Appenroth K.J., Ray A.K., Abdullah S.R.S., have 15,14,13,12 publications respectively. Fig. 3 provides top ten most prolific authors in terms of number of publications on the theme.

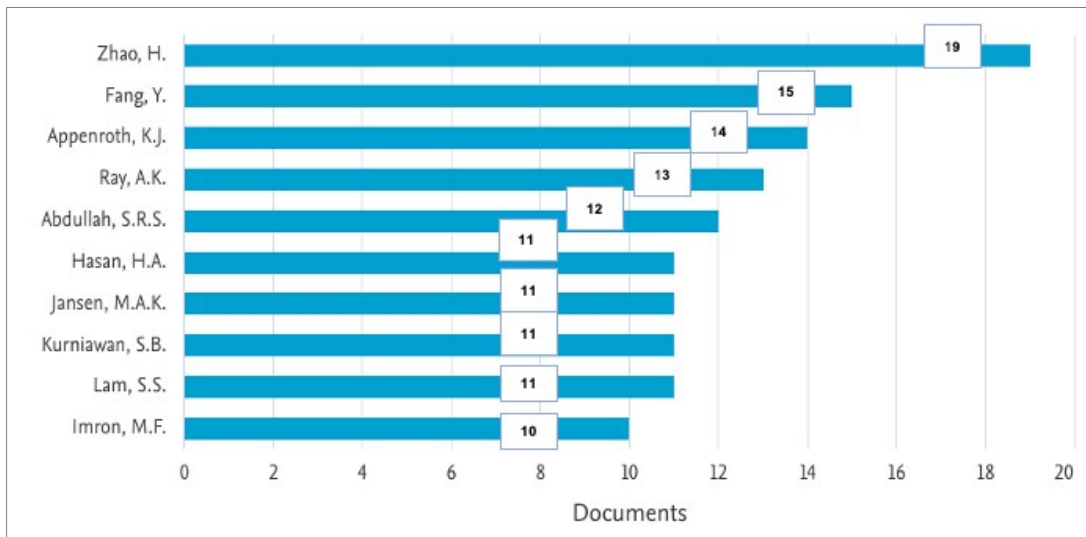


Fig.3. Top ten author publications on duckweed bioresource in aquaculture
(Source: Scopus, 2024)

Country wise highest 356 works are contributed from China. Among top 10 countries addressing the theme, India has second to highest number of documents 322; followed by documentations from US (150), Malaysia (85), Egypt (68), Brazil (61), Germany (55), UK (54), Australia (53), and Netherlands(44) as can be seen in Fig.4.

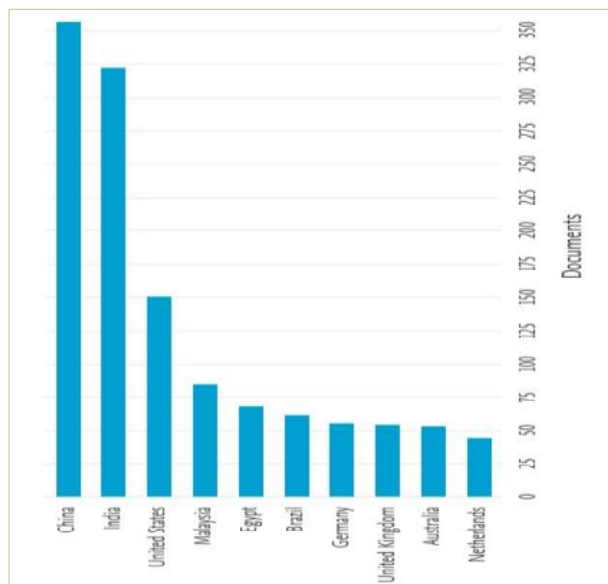


Fig.4. Top ten country publications on duckweed bioresource in aquaculture
(Source: Scopus, 2024)

Top 10 prolific organizations in terms of document count on the subject, are listed in Fig.5. These include three from China- Chinese Academy of Science, Ministry of Education of the Peoples' Republic of China, and University of Chinese Academy of Sciences. The Indian Council of Agricultural Research, India; University Kebangsaan Malaysia, Malaysia; Wageningen University and research, Netherlands; North Carolina State -NC State university, US; ICAR Central institute of fisheries education, India; Visva Bharti University, India are amongst the topmost contributors on the topic. Notably, Chinese organizations have outstanding contribution, extensively exploring resource potential of duckweeds in aquaculture practices.

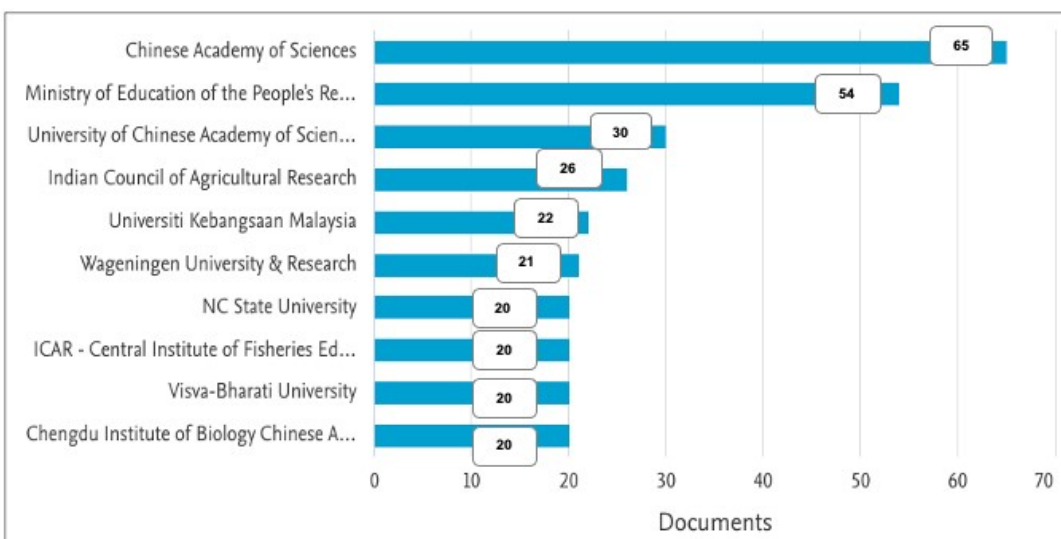


Fig.5. Top 10 organizations contributing on duckweed bioresource in aquaculture

(Source: Scopus, 2024)

Top five funding sponsors on the research topic listed in Table 2 are National Natural Science foundation of China, National key research and development program of China, European Commission, Ministry of higher education, Malaysia and Chinese Academy of Sciences.

Table 2: Top five funding sponsors on the research topic

(Source: Scopus, 2024)

Rank	Funding sponsors	Documents sponsored
1	National Natural Science Foundation of China	138
2	National Key Research and Development Program of China	44
3	European Commission	39
4	Ministry of Higher Education, Malaysia	35
5	Chinese Academy of Sciences	32

Top five journals publishing on the topic (Fig.6) are Bioresource technology (Elsevier’s) with largest number of ‘51’ published workssince 1992, followed by Science of the Total Environment (Elsevier’s) ‘45’ documents, Environmental Science and Pollution Research(Springer-Verlag GmbH Germany, Springer Nature)‘33’, Journal of Environmental Management (Elsevier’s) ‘30’, and Chemosphere (Elsevier’s) ‘30’.

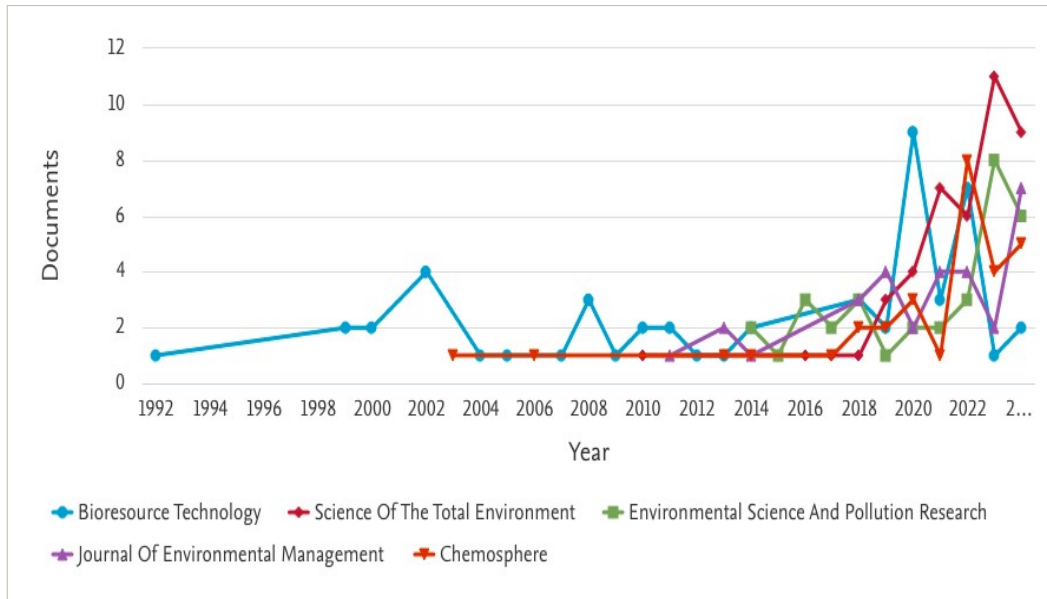


Fig.6. Year-wise documents in top five publication titles on duckweed bioresource in aquaculture

(Source: Scopus, 2024)

3.2 Bibliometric Network Analysis

Bibliographic network investigates and visualizes connections generated amid publications on the basis of authorship, citations, common keywords, specifying semantic and citation networks as well as research collaborations among authors, organizations and countries.

3.2.1 Co-authorship as per countries

Region based co-authorship links 110 countries according to threshold criteria. Of these 8 were filtered out due to no connection, giving 102 connected country clusters. From these 102 countries, largest set of 97 belonging to 14 clusters were connected.

Of the top 5 visualized clusters in Fig. 7., largest cluster group includes China, Congo, Rwanda, Belarus, and Slovenia. Second largest cluster includes India, Australia, Indonesia, Japan, Norway, South Korea, Tanzania, and Zambia. Third largest clustering countries are US, Mauritius, and Nepal.

Fourth grouping includes Malaysia, Cameroon, Cuba, Ecuador, Iraq, Kenya, Libya, Libyan Arab Jamahiriya, Mexico, Morocco, Nigeria, Peru, and Sudan. Fifth largest clustering is among UK, Austria, Israel and Qatar. Clearly China, India, US, Malaysia and UK are top 5 countries as per

total linkage intensities with other countries (table 3). Additionally, China, India, and US also are among top three countries based on documents and accrued citation counts.

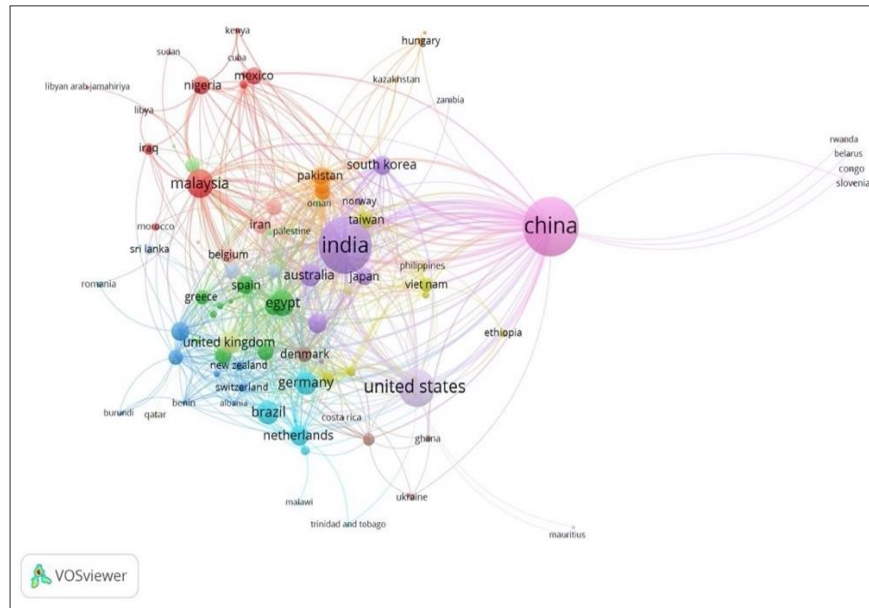


Fig.7. Co-authorship as per countries as per overall link strengthon duckweed bioresource in aquaculture (Scopus, 2024)

Table 3: Top ten countries ranked as per overall link strength(Source: Scopus, 2024)

Rank	Country	No. of documents	citations	Total link strength
I	China	356	11882	250
II	India	321	11853	220
III	US	150	7262	174
IV	Malaysia	85	2563	121
V	UK	53	2963	94
VI	Australia	53	2185	92
VII	Egypt	68	4601	92
VIII	Germany	55	2119	88
IX	South Korea	38	1510	72
X	Denmark	25	967	71

3.2.2 Co-authorship Organizations

3,946 organizations have co-authorship connections. From these, 1000 connected organizations having greatest link strength were selected. Largest set of 106 linkages are finally visualized (figure 8). Henan Province engineering research center for biomass value-added products, School of Forestry, Henan Agricultural University, Zhengzhou, China has maximum five documents accumulating 171 citations and highest link strength of ‘39’ (table 4).

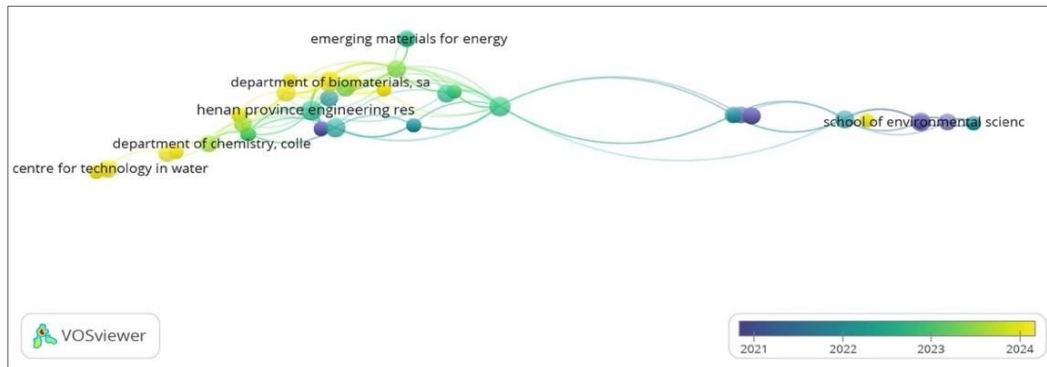


Fig.8. Organization co-authorship on duckweed bioresource in aquaculture

(Source: Scopus, 2024)

Table 4: Top ten organization co-authorships ranked as per overall link strength

(Source: Scopus, 2024)

Organization	Documents	Citations	Total link	▼
henan province engineering research center for biomass...	5	171	39	
department of chemical engineering and materials scien...	3	75	34	
higher institution centre of excellence (hicoe), institute of ...	3	27	34	
department of biomaterials, saveetha dental college, sav...	3	29	33	
higher institution centre of excellence (hicoe), institute of ...	5	52	30	
department of mechanical engineering of agricultural ma...	3	36	29	
biofuel research team (brteam), terengganu, malaysia	2	29	27	
university of chinese academy of sciences, beijing, 1000...	17	510	26	
aarhus university, department of bioscience, arctic rese...	4	146	23	
aarhus university, department of ecoscience, frederiksb...	1	27	21	

3.2.3 Co-Authorship As Per Authors

Out of total 6,243 authors, the largest set of connected authors is that of 241. Author linkages are represented in 16 discrete clusters. Fig. 9 visualizes co-authorships of authors based on total link strength (TLS). Zao Hai in red cluster has highest collaborations with TLS of 94, seconded by

Fang Yang with 348 citations and TLS= 84. Table 5 elaborates on top 10 co-authorships as on the basis of TLS.

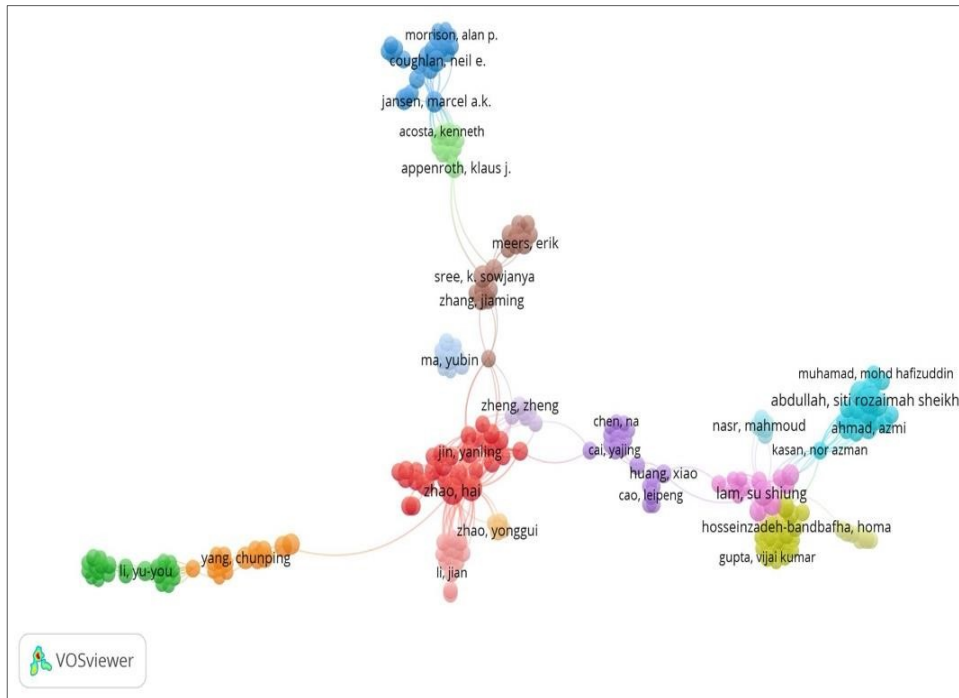


Fig.9. Co-authorship author according to total link strength on duckweed bioresource in aquaculture

(Source: Scopus, 2024)

Table 5: Ten topmost author co-authorships as per TLS on duckweed bioresource in aquaculture

(Source: Scopus, 2024)

Author	Documents	Citations	Total link strength
zhao, hai	18	575	94
fang, yang	14	348	84
abdullah, siti rozaimah sheikh	14	492	67
kurniawan, setyo budi	11	483	62
lam, su shiung	11	261	58
imron, muhammad fauzul	10	414	57
hasan, hassimi abu	11	395	54
sonne, christian	7	191	49
othman, ahmad razi	8	349	48
peng, wanxi	6	202	43

3.2.4 Co-occurrence of Keywords

A total of 10,367 author keywords are generated, from these 1,000 with greatest TLS are selected. After exclusion of 4 keywords that did not meet the criteria, 996 keywords are filtered these belong to 6 discrete clusters (Fig.10).

Yellow Cluster is represented by sustainability and sustainable fuels, “circular economy”, “food waste”, “biogas”, “bio-energy”, “biofuel”, “technology”, “recycling”, “life cycle”;

Red Cluster has relatedness to ecotoxicology, contaminants and health risks, consisting included terms as - “ humans”, “water pollutant”, “ecotoxicology”, “pesticide”, “plastic waste”, “heavy metal”, “atrazine”, “amoxicillin”;

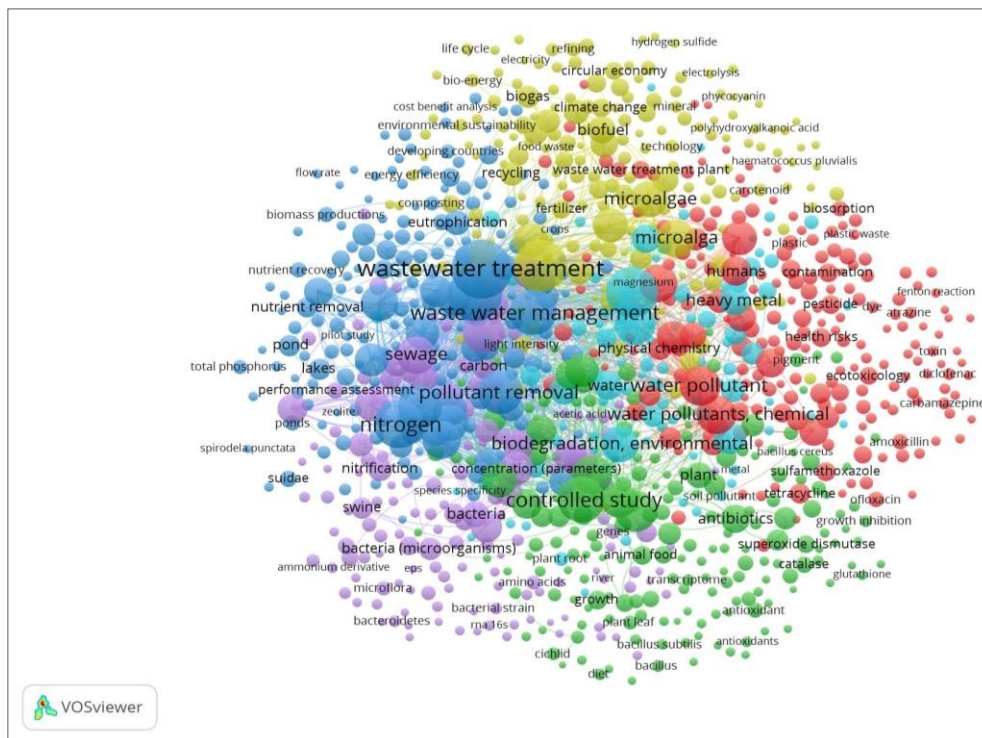


Fig.10. Author keywords according to total link strength on the theme (Source: Scopus, 2024)

Blue Cluster is related to “waste water treatment”, “eutrophication”, “lakes”, “ponds”, “nutrient removal”, “nutrient recovery”, “nitrogen”, “carbon”, “total phosphorous”;

Turquoise Cluster has terms “ heavy metal”, “magnesium”, “water”;

Green Cluster is centralized on study of antioxidant potential and growth effects - terms comprising cluster are “controlled study”, “plant”, “plant leaf”, “antioxidants”, “growth”, “superoxide dismutase”, “catalase”, “glutathione”, “growth inhibition”, “diet”, “transcriptome”;

Purple cluster is thematized by key terms “microflora”, “bacteria”, “Bacteroidetes”;

“sewage”, “nitrification”, “genes”, “bacterial strains” defining association of bacterial flora to duckweeds.

Clearly waste water treatment, management; heavy metal; pollutant removal; human; biodegradation; biofuels, are the central themes among these discrete clusters.

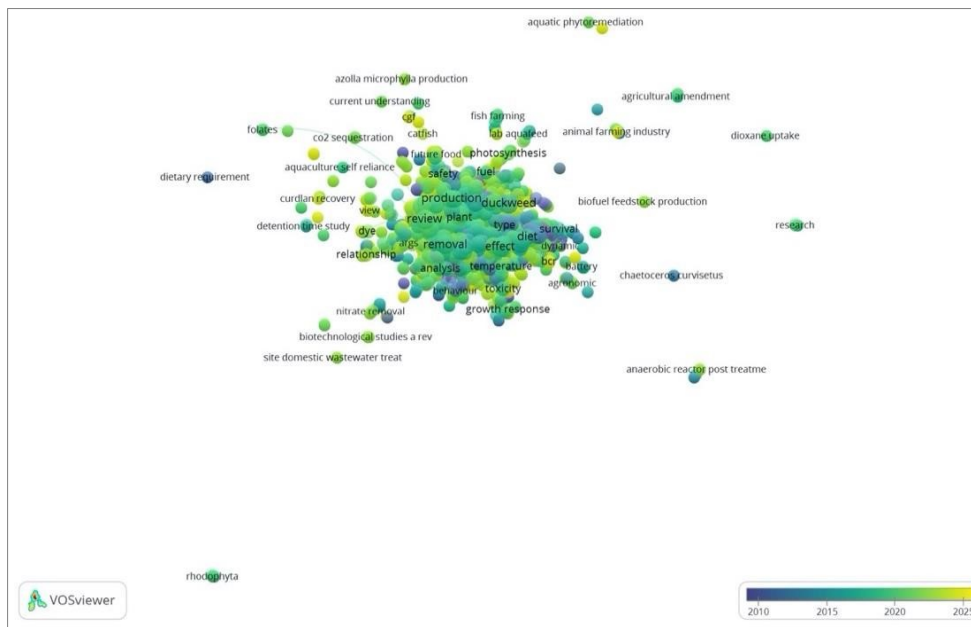


Fig.11. Title field as per occurrence on the topic (Source: Scopus, 2024)

Title field provided 4,280 terms, with 3,937 largest connected set of items, linked among 110 clusters. Prominent clusters focus on duckweed as ‘sustainable feed source’ with terms in common cluster as ‘health food’, ‘bioeconomic value addition potential’, another cluster links duckweed to ‘algal biomass’, ‘microalgae chlorella’ and spirulina, and commonality to ‘plant origin’ ‘black soldier fly’ as ‘alternative source’ of feed along with process technologies for ‘methane production’, ‘bio-methanation’ indicating bioresource potential.

CONCLUSIONS

Sustainability in aquaculture can be achieved by using equitably sustainable food sources in feed compositions. Feed is a source of nutrients and energy, fundamental for growth, reproduction, and fish health (NRC, 1993). Nutrient profile of aquafeed determines fish welfare and consequent consumer health. In this aspect careful selection of feed alternatives should be done taking into account for protein content as essential nutrient. Plant based feed alternatives derived from duckweeds provide great promise to aquaculture sustainability extending its resource potential in aquaculture practices. Strong linkages of China, India, US are visualized in terms of documents published, citations and total link strength as top three contributors country wise.

Bioresource technology (Elsevier’s) has highest number of published works. Author wise Zhao Hai has maximal TLS; while Henan Province engineering research center for biomass valueadded products, China has maximum documents, citations and organization wise TLS.

Time trending growth in publications as well as shifting developments in keyword and title field use of terms including, *alternative source; bioeconomy; circular economy; waste water treatments* suggest increasing interest in the discourse to harness potential of duckweed biomass in sustainable aquaculture growths.

Declaration-

There is no financial and non-financial support received and there is no conflict of interest for the publication.

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GREEN ADVERTISING SKEPTICISM: A BIBLIOMETRIC ANALYSIS

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DOI: **10.5958/2249-7137.2024.00019.4**

ABSTRACT

Purpose: This study seeks to analyse quantitatively historical research trends and propose future directions in the field of consumer's skepticism towards green advertising through bibliometric analysis.

Methodology: A bibliometric analysis was conducted on 261 articles sourced from Scopus and Web of Science, following Donthu et al. (2021) with the help of Biblioshiny. This study includes performance analysis and science mapping.

Findings: "Skepticism towards green advertising" is found to be falling in the Niche quadrant of Thematic Map indicating an under researched area and co-occurrence analysis presents two clusters revolving around 'trust' and 'skepticism'

Limitations: The selection of articles is confined to Scopus and Web of Science database published after 2000 in English language.

Practical Implications: The study shall provide insights to academicians understanding literature and identifying the gaps.

Originality/value: The study is a novel attempt to map the major themes in literature on 'skepticism towards green advertising'.

KEYWORDS: Green Advertising, Skepticism, Credibility, Bibliometric Analysis, Green Washing.

INTRODUCTION

Recent decades have witnessed a raising interest in green products as pollution and climate change have become global social concerns (Zhang et al., 2018). With the increasing trend toward sustainable purchasing, companies invest substantial amount of money advertising their sustainability (Farooq & Wicaksono, 2021). Green advertising is increasingly utilized to promote eco-friendly products, and its positive impact on consumers' intention to purchase green products

is well-documented in the literature (Schmuck et al., 2018). It is suggested that green advertising creates a firm's or product's green image by using environmental claims to influence environmentally vigilant consumers (Segev et al., 2016). Companies can gain competitive advantage by presenting their products as environmental friendly products, to distinguish them from others (Tan, 2011). However, green advertisements frequently incorporate unclear facts, technical language, and vague messages. They often provide insufficient accurate details regarding the benefits of products for environment or exaggerate the advantages. These types of green advertisements can lead to increased consumer skepticism (Baum, 2012; Do Paço & Reis, 2012). Undoubtedly, a crucial issue in green marketing and advertising is whether eco-conscious consumers are skeptical of green advertisements (Do Paço & Reis, 2012).

Researchers are not only interested in knowing if the consumers are skeptical about green advertising but are also curious about its repercussions on market success of their green advertising campaigns. Consumer skepticism can cause serious financial damage to companies (Farooq & Wicaksono, 2021). Since skepticism reduces the positive impact of communication, analysing it is essential and may help companies craft more effective messaging to better engage consumers (Mohr et al., 1998). In the past, the importance of studying the consumer's skepticism of green advertising is well established. According to Mohr, Eroglu, and Ellen (1998), "consumer reluctance toward environmental claims is of great importance for public policymakers, consumer researchers, and practitioners. The study of this topic could contribute to gaining a better understanding of green consumers" (Mohr et al., 1998). Several studies have touched upon green advertising skepticism in various contexts. A lot of research has been done focusing on antecedents and consequences of green advertising skepticism (Do Paço & Reis, 2012; Farooq & Wicaksono, 2021; Leonidou & Skarmeas, 2017; Maria Finisterra do Paco & Reis, 2013; Silva et al., 2020; Theses & Lee, 2013). Some authors have studied the linkage of green advertising skepticism with consumer's green consumerism (Matthes & Wonneberger, 2014a), persuasion knowledge (Theses & Lee, 2013), consumer responses (Lee, 2013) and purchase behaviour (de Sio et al., 2022; Tan, 2011; Zhang et al., 2018). The green advertising skepticism have also been studied in the framework of social media (Luo et al., 2020) and influencer marketing.

With the ever-growing interest of academicians and marketers in understanding the consumer's skepticism towards green advertising there is evidently much room for on-going and up-to-date exploration of bibliometric analysis in this domain. To the best of the authors' knowledge there is no study based on bibliometric analysis on the topic of skepticism towards green advertising and that can provide a one stop overview of existing literature and empowers scholars to identify the knowledge gaps for future investigation. The present study therefore attempts to identify the pattern of past research on skepticism towards green advertising and answer the following research questions:

RQ1: What are the overall research publication outputs/trends related to skepticism towards green advertising.

RQ2: Who or which are the most influential countries, journals, articles and authors amongst all those who have contributed to literature pertaining to skepticism towards green advertising?

RQ3: Can articles on skepticism towards green advertising be categories into different research streams?

The above research questions are addressed by employing bibliometric analysis. “Bibliometric analysis is a popular and rigorous method for exploring and analysing large volumes of scientific data. It enables us to unpack the evolutionary nuances of a specific field, while shedding light on emerging areas in that field” (Donthu et al., 2021). According to Donthu et al. (2021), bibliometric analysis methods are divided into two main categories: 1) performance analysis (related to assessing the productivity and influence of individual contributors such as authors, institutions, countries and journals), 2) science mapping (examines the relationships among individual contributors by employing techniques including citation analysis, co-authorship analysis, co-word analysis and bibliographic coupling) (Donthu et al., 2021). In this paper both performance analysis and science mapping are done. In the following section, the methodology adopted for conducting the analysis is discussed stating the procedure followed for acquisition of data, sources of data collection, screening of articles, extraction of bibliometric data and combining of the data from the two sources. Then we proceed towards, the performance analysis of bibliometric data to identify the yearly publication trends, most prolific journals, countries, articles and authors. With the help of Biblioshiny software of R Studio, the co-citation analysis, co-occurrence analysis and thematic mapping is done to identify the relationships between the various components of bibliometric data. The study ends with the discussion of the results and conclusions.

Research Methodology

In this study, we shall follow the procedure suggested by Donthu et al., 2021. He alluded a five-step procedure: (i) Define the aims and formulating research questions, (ii) select the techniques for bibliometric analysis, (iii) collect the bibliometric data from databases (iv) conduct the bibliometric analysis and (v) state the findings (Donthu et al., 2021). The research questions have already been enumerated above for the present study. The next step requires, choosing the bibliometric techniques. Based on the objectives and research questions of this study, we will be using the descriptives such as annual growth rate of publications and average citations per publications. Then the study will discuss the annual scientific production, most relevant sources, most globally cited documents, countries with maximum no. of citations for the purpose of performance analysis. The science mapping will be done with co-authorship analysis, co-occurrence analysis of keywords and thematic mapping to examine the relationships between research constituents.

In accordance with the methodology proposed by Donthu et al., 2021, it was essential to collect high-quality data sourced from a reputable database for the bibliometric study. This study utilizes data derived from the Scopus and Web of Science databases, which are extensively employed by the global research community and offer data in a format compatible with various bibliometric analysis applications. Data was extracted from both sources using similar keywords such as green advertising, skepticism, credibility, trust, green washing and puffery with Boolean operators “OR” and “AND”. The search was further restricted to include the only the journal articles published from year 2000 to 2024 in English language. Another inclusion criteria were applied to include the articles from the subject areas of Business, management and accounting, social sciences, economics and humanities. It was decided to include the publications belonging to the period of 2000 to 2024 as not much research was found before 2000 and tracking research in last 25 years would help academicians understand the trends in green advertising better in the changing economic and environmental scenario. The search query resulted in extraction of 201

records from Scopus and 180 records from Web of Science. The two data files were then merged using R Studio package, Version: 2024.09.1+394. The combined data from the two databases had 261 records after removing 118 duplicate documents. Although, the data extracted from two databases belonged to 2000 – 2024, after merging the two files, the data before 2007 was removed by R Studio (the reason could be difference in the format of two databases).

Data Analysis and Findings

For quantitatively assessing the academic output, we generally use bibliometric analysis (Cobo et al., 2011). “The two main techniques of bibliometric analysis are performance analysis and science mapping” (Donthu et al., 2021). For the purpose of this study, we shall be analysing the data for both these techniques with the aim of drawing conclusions regarding the major trends in the publications in the field of skepticism towards green advertising.

Performance Analysis: The descriptives based on bibliometric data extracted from are summarized in Table 1. The data that is combined with the help of R Studio, belongs to 2007 to 2024 and has been published in 138 Journals. The total number of articles that are analysed for bibliometric analysis is 261. The annual growth rate in the publications is approximately 29% which shows that the area of research has been attracting the researcher’s attention at a very fast pace and that the area has a lot of scope for further study and exploration. The overall author’s keywords count is 840 showing the varied contexts in which green advertising skepticism have been studied.

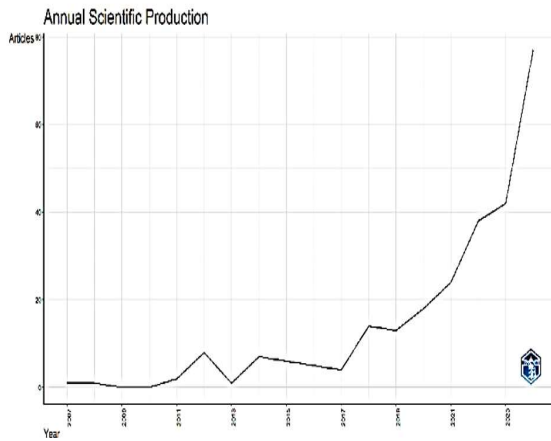
TABLE 1 BASIC INFORMATION ABOUT THE EXTRACTED DATA

Description	Results
Total number of documents	261
Sources (Journals)	138
Timespan	2007: 2024
Annual Growth Rate %	29.11
Document Average Age	2.95
Average citations per doc	26.62
References	10168
Author's Keywords	840
Authors	715
Authors of single-authored docs	23
International co-authorships %	22.61

Annual Scientific Production

Figure 1 illustrates the yearly scientific output of documents pertaining to green advertising skepticism. From 2007 to 2024, publications have increased significantly, as evidenced by the growing trend in the annual scientific production graph. Despite slow growth until 2016, there has been a significant increase in publications thereafter, with the biggest output occurring in the past several years. Since 2020, the growth rate has been 38.5, 33.3, 58.3, 10.5&83.3 respectively for the years 2020, 2021, 2022, 2023&2024 which clearly indicates that researchers are becoming interested in this domain and that a lot of scope of further research exists. Thus, we expect more research in the coming years.

Figure1 Annual Scientific Production

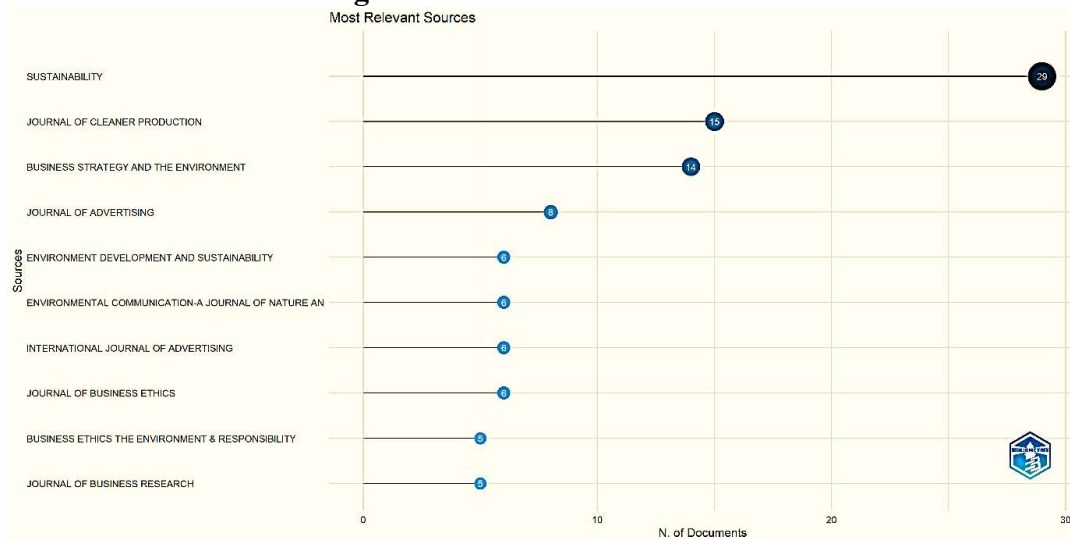


Year	Articles	Year	Articles
2007	1	2016	5
2008	1	2017	4
2009	0	2018	14
2010	0	2019	13
2011	2	2020	18
2012	8	2021	24
2013	1	2022	38
2014	7	2023	42
2015	6	2024	77

Prolific Journals and Articles

Based on the combined data of the Scopus and WOS, the list of top 10 journals that have published articles in the domain of skepticism towards green advertising have been provided in Figure 2. The data shows that maximum numbers of articles have been published in *Sustainability*, followed by *Journal of Cleaner Production* and *Business Strategy and The Environment*. Out of the total number of articles extracted (i.e. 261), the top ten journals have published 100. This information can immensely help researchers and academicians who are interested in studying the topics related to skepticism towards green advertising.

Figure 2 Most Relevant Sources



Next, the study identifies and enumerates the most globally cited articles in Table 2. TC refers to total number of citations. On looking at the title, most of the articles are related to green washing, its reasons, affects and misleading green advertising. This is signally towards the presence of exaggerations in green advertising and that the researchers are keenly interested in this subject. This table is also relevant for those who wish to study green washing and build an understanding for future research.

TABLE 2 MOST GLOBAL CITED DOCUMENTS

S.No.	Title	Authors	Year	TC
1	Greenwash vs. Brownwash: Exaggeration and Undue Modesty in Corporate Sustainability Disclosure	Kim, E. H., & Lyon, T. P.	2015	326
2	The influence of greenwashing perception on green purchasing intentions: The mediating role of green word-of-mouth and moderating role of green concern	Zhang, L., Li, D., Cao, C., & Huang, S.	2018	267
3	Perceived Greenwashing: The Effects of Green Marketing on Environmental and Product Perceptions	Szabo, S., & Webster, J.	2021	263
4	A new model for testing green consumer behaviour	Do Paco, A., Shiel, C., & Alves, H.	2019	210
5	Bridge the gap: Consumers' purchase intention and behavior regarding sustainable clothing	Rausch, T. M., & Kopplin, C. S.	2021	209
6	Misleading Consumers with Green Advertising? An Affect-Reason-Involvement Account of Greenwashing Effects in Environmental Advertising	Schmuck, D., Matthes, J., & Naderer, B.	2018	197
7	Greenwashing and environmental communication: Effects on stakeholders' perceptions	Torelli, R., Balluchi, F., & Lazzini, A.	2020	185
8	Consequences of "greenwashing": Consumers' reactions to hotels' green initiatives	Rahman, I., Park, J., & Chi, C. G. Q.	2015	184
9	Consumers' perceptions of individual and combined sustainable food labels: a UK pilot investigation	Sirieux, L., Delanchy, M., Remaud, H., Zepeda, L., & Gurviez, P.	2013	181
10	Factors Affecting Skepticism toward Green Advertising	do Paço, A. M. F., & Reis, R.	2012	166

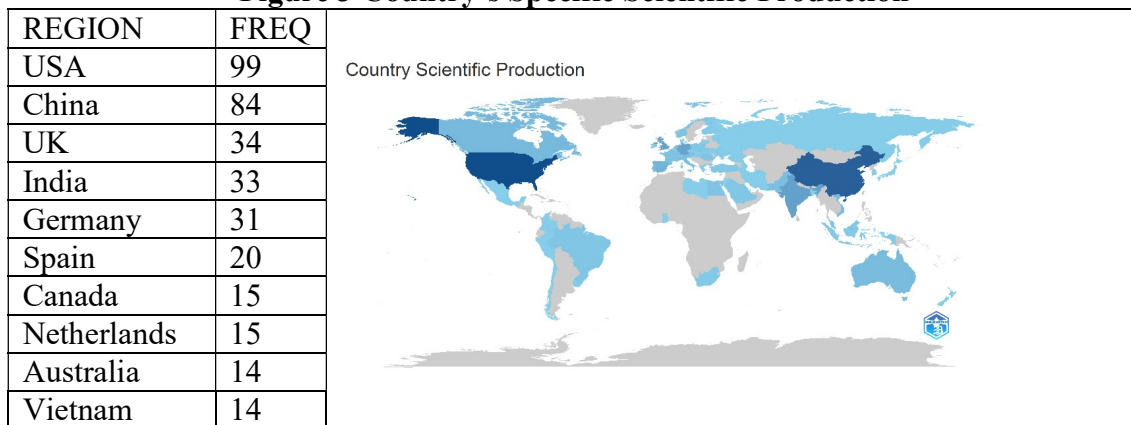
Table 3 enumerates the top 10 Countries with most citations on skepticism towards green advertising. According to the bibliometric analysis with the help of Biblioshiny software, it is revealed that publications from the papers published in USA have been cited 1733 times. China received 1138 citations followed by Portugal with 466 citations. The Indian papers have been cited 310 times with an average citation rate of 16.3. Figure 3 presents the top ten countries where the maximum publications related to skepticism towards green advertising have been published in Scopus and Web of Science databases. USA, China, UK, India and Germany have the maximum number of publications. This shows that these countries are aware of their responsibility to make green advertising more authentic and believable as they are making a focused attempt to study this domain. Also, the other countries can benefit from the studies that are done in these countries.

TABLE 3 TOP 10 COUNTRIES WITH MOST CITATIONS ON SKEPTICISM TOWARDS GREEN ADVERTISING

Country	Total Citations	Average Article Citations
USA	1733	36.9
China	1138	28.4
Portugal	466	77.7
Austria	424	84.8
Netherlands	414	41.4
Germany	394	23.2
India	310	16.3
Italy	276	39.4
Canada	271	67.8
France	249	124.5

Source: Authors Own compilation based on the data from Scopus; Web of Science with Biblioshiny

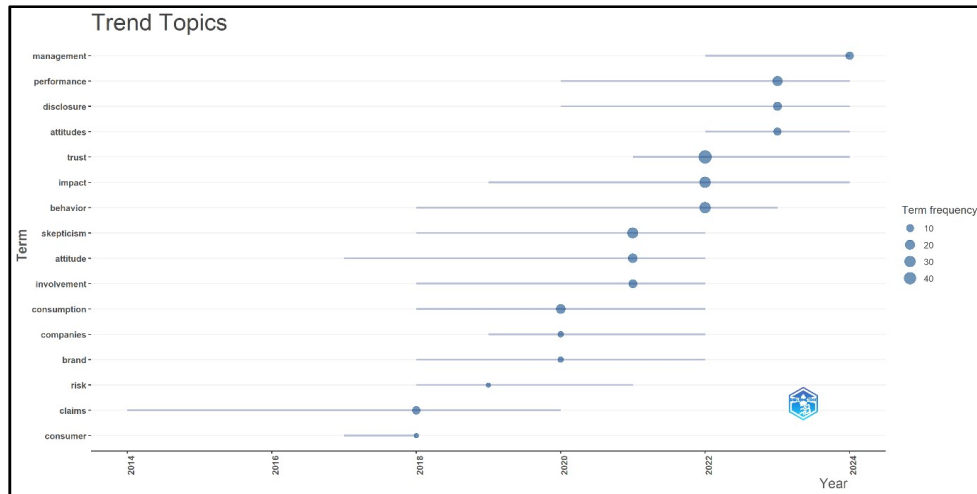
Figure 3 Country’s Specific Scientific Production



Science Mapping: After the above analysis on descriptives, most prolific authors, journals, articles, and countries, the present study moves ahead by presenting the co-authorship analysis, co-occurrence analysis and thematic mapping to conduct an advanced and detail study using Biblioshiny Software. Science mapping helps in establishing the connections and structural associations between the research elements ((Donthu et al., 2021). We first conducted the co-authorship analysis to identify the collaboration networks among the countries. The various clusters of countries collaborating with one another is depicted by different colours and the thickness of linkages shows the frequency of collaborations. According to collaboration network plot given in Figure 4, USA and China has largest networks with other countries. India has been connected to many countries including USA, China, Ireland, Australia, Saudi Arabia.

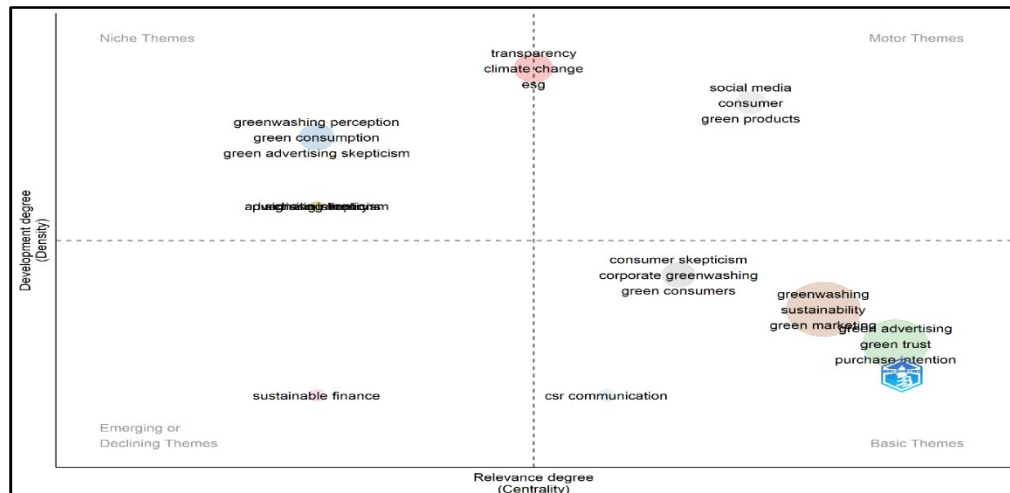
Figure 6 shows the most trending topics in the domain of skepticism towards advertising. The terms like skepticism, trust, attitude, disclosures have been trending after 2020, showing that the interest of the researchers have increased in these terms and they have been frequently used and researched in the recent years.

Figure 6 Most trending topics in the domain of perceptions of green advertising



The figure 7 illustrates the thematic map generated using Biblioshiny, which categorizes topics or themes according to two dimensions: Relevance Degree (Centrality) on the x-axis and Development Degree (Density) on the y-axis. Relevance Degree (Centrality): Signifies the significance or interconnectedness of an issue within the broader field of study. Themes positioned further to the right are more central or pertinent. Development Degree (Density): Indicates the extent of a theme's development within the domain. Themes at higher levels are more extensively investigated and elaborated upon. Thematic maps are frequently employed in bibliometric or thematic analysis to categorize themes within a study subject into four quadrants. (i) Top-Right quadrant (Motor Themes): Extremely pertinent and thoroughly elaborated. These themes propel the discipline forward. This diagram includes issues such as social media, consumerism, and eco-friendly items. (ii) Top-Left (Niche Themes): Well developed yet peripheral. These are specialized subjects with extensive investigation with minimal wider significance. Topics such as transparency, climate change, and ESG (Environmental, Social, and Governance) are prevalent. (iii) Bottom-Right (Fundamental Themes): Significantly pertinent yet underdeveloped. These are fundamental concepts that are significant to the field but necessitate further investigation. This quadrant encompasses themes such as greenwashing, sustainability, and green marketing. (iv) Bottom-Left (Emerging or Declining Themes): Minimally pertinent and underdeveloped. These are either nascent issues or those that are diminishing in significance within the area. Sustainable finance is situated here.

Greenwashing is a pivotal issue of significant relevance, situated in the Basic Themes quadrant. Nonetheless, green advertising skepticism emerges in the Niche Themes quadrant, indicating that the area is well researched but a specialized area of study within green washing domain. The topic placed in this quadrant can be a specialized subfield with focused attention, but it may not yet have fully explored all its potential dimensions. The additional keywords in the cluster include perception of green advertising and green consumption.

Figure 7 Thematic Map

Discussion and Conclusions

The study presents the historical trends on the subject skepticism towards advertising based on 261 articles extracted from Scopus and Web of Science databases for the period of 2007 to 2024. An annual growth rate of 29.11 percent indicates a massive interest of researchers in the field. The spike in the annual production of publications was observed in 2018 and since then the annual production has increased from 14 articles in 2018 to 77 articles in 2024. Among the most prolific Journals, Sustainability and Journal of Cleaner Production has published majority of articles on this subject. The study also reveals that green washing has been the common subject of the most cited articles globally and that signals presence of exaggerations in green advertising that leads to skepticism towards green advertising. USA and China have not only published the maximum number of articles but also received highest citations. Researchers from India too have been keenly interested in the subject putting India in the most prolific countries publishing on the subject and have collaborated with researchers from USA, China, Pakistan, Saudi Arabia, Australia and Ireland.

The bibliometric analysis identified the main constructs with which the skepticism towards green advertising has been studied. These include behaviour, consumers, attitude, information, involvement, antecedents, consequences, intention, willingness-to-pay, persuasion knowledge, sustainability, corporate social responsibility and scale. This analysis shall assist researchers to study the domain of skepticism towards green advertising. In past, attempts have been made to study the antecedents and consequences of skepticism towards green advertising. Factors affecting skepticism towards green advertising discussed in previous studies include gender, green washing incidents, the consumers' perception of companies self-serving motives, industry and company size (Farooq & Wicaksono, 2021). It is also shown that more environmentally concerned consumers are more skeptical about green advertising (Do Paço & Reis, 2012). The negative relationship between green consumerism and green advertising skepticism in general and skepticism towards a green ad is also established in literature (Huang & Darmayanti, 2014; Matthes & Wonneberger, 2014b). Purchase intention, brand image, positive brand attitude (Nagar, 2015) and word of mouth has been studied to be a consequence of green advertising skepticism. Skepticism towards green advertising is generally affected by Persuasion knowledge (Isaac & Grayson, 2016; Kiymalıoğlu & Akinci, 2021).

Future Research Directions:

While skepticism in green advertising has been studied, its relationship with adjacent topics like corporate social responsibility (CSR), ethical marketing, and consumer activism can be further explored. Comparative studies across different industries or marketing media can be undertaken in future to see if skepticism behaves differently in these contexts. We also suggest the researchers to study the relationship between skepticism towards green advertising with past experiences with green washing, evolving environmental knowledge, peer influence and personality differences. Another direction of future research that can be suggested is to analyse the impact of disclosures and verifiable claims on skepticism towards green advertising. This would help the policy makers in laying the guidelines for marketers and restricting green washing practices. Lastly, the researchers can undertake a similar bibliometric study based on data bases such as dimensions and google scholar along with Scopus and Web of Science, for a more comprehensive bibliometric analysis.

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