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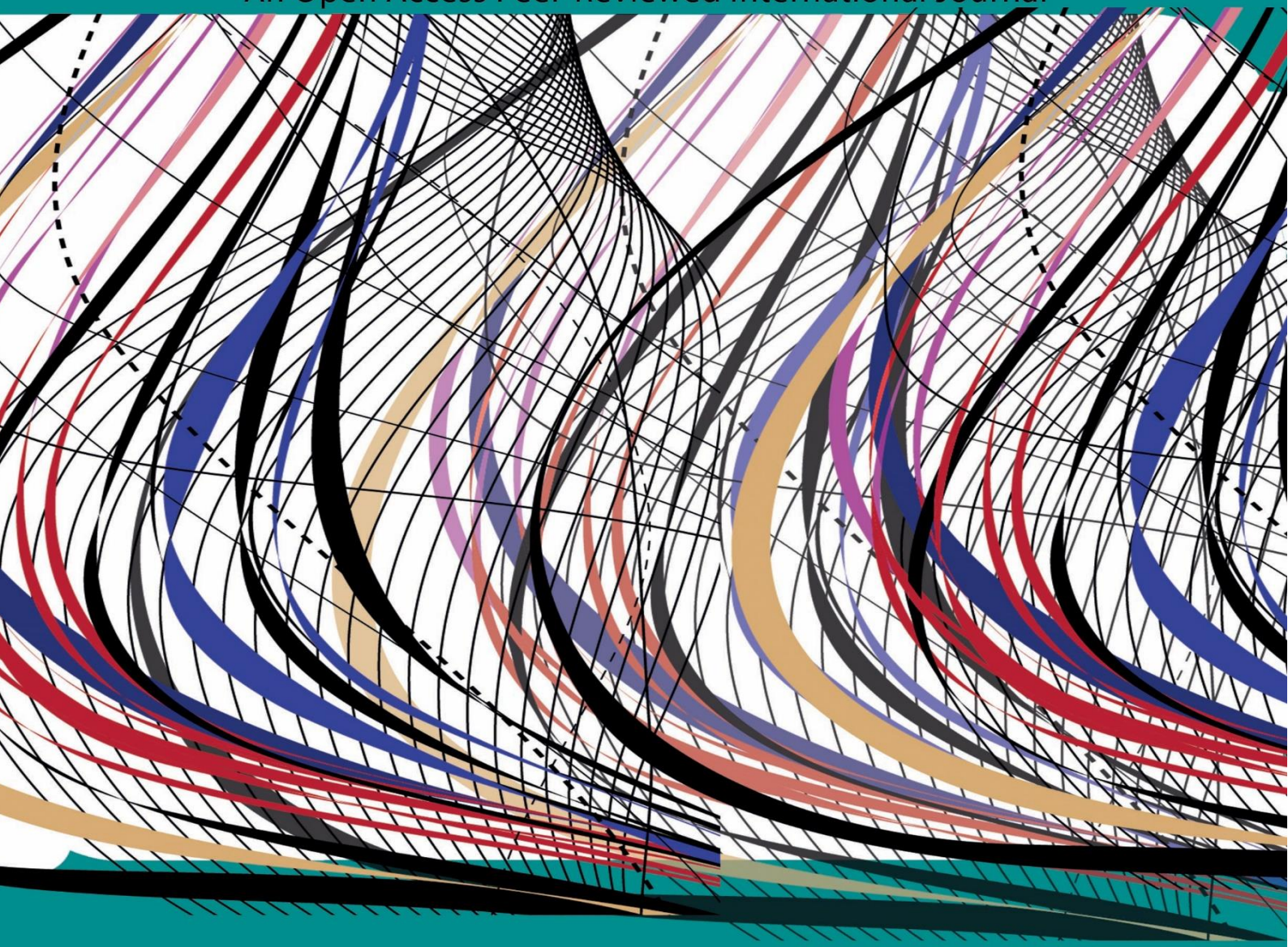

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Characterization of Leachate and its Impact on the Groundwater Quality at Shivari Landfill, Lucknow

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Abstract— *Water is essential for living and is used for drinking, irrigation and other purposes. Groundwater, in general terms, is defined as water that is present beneath the underlying rocks in the earth's surface. When an unwanted contaminant changes the physical, biological and chemical properties of water, it is known as water pollution. A Landfill is the most common waste disposal practices used in many parts of the world. It is the cheapest of all waste management practices. The aim of this project is to characterize the landfill leachate and assess the groundwater quality in the vicinity of landfill to find out the impact of landfill leachate on groundwater. The samples were taken for both groundwater and the leachate to evaluate physico-chemical properties along with heavy metal assessment. The samples for leachate were collected from the outlet near the landfill site while the groundwater samples were collected from the handpump near the landfill site. It was observed that the mean value of TDS, EC, CL, Total Alkalinity, Mg, Na and Mn are found exceeding the permissible limits of BIS and WHO standards.*

Keywords— ***Municipal Solid Waste treatment plant, Leachate, Groundwater, Piper Diagram Pearson's correlation coefficient.***

I. INTRODUCTION

Pure water had been a prime requisite for the existence of Human civilisation from past till now and groundwater is an important component of pure water especially in a developing country like India for drinking, domestic, irrigation purposes. But currently India is facing a water crises it had only 4% of fresh water reserves and 16% of world's total population and this condition is going to be worsen in future as India will be the most populous country in the world. In such situation contamination of groundwater is the major problem in India especially in rural areas. Contamination of ground water may lead to outbreak of diseases like hepatitis, diarrhea, vomiting, abdominal pain, dysentery etc.

According to world bank estimate 21% of communicable diseases in India is linked with unsafe drinking water and lack of hygiene practices. More than 500 children under the age of 5 die each day from diarrhea in India alone. As per WHO, about 80% of all the diseases in human beings are caused by water (Kavitha and Elongova, 2010). Therefore the suitability of groundwater for various purposes were determined by it's physical, chemical and biological characteristics. MSW treatment plant significantly affect the local environment in various ways such as contamination of surface and groundwater bodies by the percolation of leachate from MSW treatment plant, contamination of soil strata as during leachate percolation some amount of leachate usually reside in the soil strata, awful gases are released during the decomposition of organic waste that may also effect local people's health. The present study was carried out to assess the groundwater quality around MSW Treatment plant during pre-monsoon season(2021-2022)and compare the result with BIS drinking water quality standard.

STUDY AREA

Lucknow, the state capital of Uttar Pradesh is situated at an altitude of 123 meters above mean sea level. Lucknow covers an area of 3244 Km^2 with a population of 3.4704 million (Census of India, 2011). It receives an average precipitation of 896.2 mm between July to September from

South West monsoon winds and occasionally from frontal rainfall occurring in January. Lucknow city generates around 1534 tonnes per day with an average generation rate of 0.39 kg per capita per day.

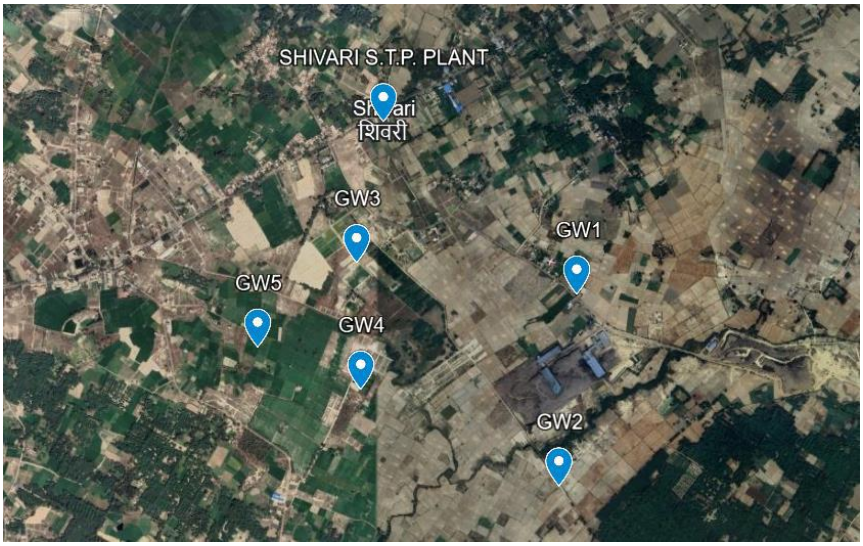

Fig. 1 View of study area (Source: Google earth)

II. MATERIALS AND METHOD

The samples of leachate as well as groundwater were collected from 5 locations. The water samples are collected in clean 1 litres plastic bottles, rinsed properly before taking the samples from the sampling points. The duration of taking leachate sample was between November 2021 to April 2022 and one sample per month was taken from the base of the landfill site. The leachate was collected from the outlet pipe which drains out the leachate from the disposal site to the nearby drainage system.

The groundwater sampling was done at different 5 locations nearby the Shivari landfill area from November 2021 to April 2022 and three samples were collected from each sampling location. All the samples of groundwater were taken randomly from the handpumps installed nearby localities of the landfill. Samples were immediately transferred to the laboratory and were stored under refrigeration.

Table 1: Details of Sampling Point

S.No	Sample Code	Source of Sample
1	GW1	Tube well
2	GW2	Handpump
3	GW3	Handpump
4	GW4	Handpump
5	GW5	Handpump

All the samples of leachate as well as groundwater were analyzed for physical parameters, chemical parameters as well as for estimating the heavy metals concentration. The leachate samples were examined for pH, Total Dissolved Solids (TDS), Total Suspended Solids (TSS), Electrical Conductivity (EC), Salinity, Total hardness, Alkalinity, Chemical Oxygen Demand (COD), Chloride (Cl), Sulphates (SO_4), Nitrate (NO_3), Total Phosphate (TP), Sodium (Na), Potassium(K), Calcium(Ca), Magnesium(Mg), Iron (Fe), Copper (Cu), Cadmium (Cd), Chromium (Cr), Zinc (Zn), Manganese (Mn), Nickel (Ni).

Table 2: Instruments and Methods used for analysis

S.No.	Parameters	Instruments
1.	Ph	Hanna Instruments Phep Pocket Sized Ph Meter
2.	Total Dissolved Solids	Thermo Orion A329 Multi Meter
3.	Total Suspended Solids	Whatmann 40 Filter Paper
4.	Electrical Conductivity	Thermo Orion A329 Multi Meter
5.	Salinity	Thermo Orion A329 Multi Meter
6.	Chloride	Volumetric Titration
7.	Hardness	Volumetric Titration
8.	Chemical oxygen Demand	Cod Digestor

9.	Nitrate	Labtronics Model Lt 290 Spectrometer
10.	Total Phosphates	Labtronics Mode Lt 290 Spectrometer
11.	Sulphates	Labtronics Model Lt 290 Spectrometer
12.	Sodium	Systronics Flame Photometer 128
13.	Calcium	Systronics Flame Photometer 128
14.	Potassium	Systronics Flame Photometer 128
15.	Lithium	Systronics Flame Photometer 128
16.	Iron	Novaa 350 Analytik Jena
17.	Copper	-do-
18.	Cadmium	-do-
19.	Zinc	-do-
20.	Chromium	-do-
21.	MANGANESE	-do-
22.	NICKEL	-do-

III. RESULTS AND DISCUSSION

LEACHATE ANALYSIS: Physical and chemical properties of the leachate are directly related to the waste composition of the landfill and also on the precipitation. The minimum, maximum, average along with the standard deviation is evaluated for each parameter and these values are compared with the general standards for discharge of environmental pollutants in inland surface water body, by Central Pollution Control Board, Lucknow. The parameters analyzed from the experiments conducted in the laboratory have shown in the Table 3.

Table 3: Characteristics of Shivari Leachate Sample

S.No.	Parameters	Leachate Samples			CPCB
		Min	Max	Mean ± STD DEV	
1.	Colour	Black	Black	Black	-
2.	Odour	Offensive	Offensive	Offensive	-
3.	pH- value	7.7	8.3	7.9± 0.233	5.5-9
4.	Electrical Conductivity (µS/cm)	39602	45800	42500 ± 2155	-
5.	Salinity (mg/l)	176	232	200 ± 24	-
6.	Total Suspended Solids (mg/l)	8096	9100	8660± 338	100
7.	Total Dissolved Solids (mg/l)	19165	25830	20980 ±2436	-
8.	Total hardness(mg/l)	4264	5320	4800 ± 357	-
9.	Calcium hardness (mg/l)	1353	1602	1440 ± 119	-
10.	Magnesium hardness (mg/l)	2994	3718	3360 ± 241	-
11.	Alkalinity (Bicarbonate)(mg/l)	3210	4295	3660 ± 381	-
12.	Chemical Oxygen Demand (mg/l)	7738	8240	8040 ± 168	250
13.	Chloride (mg/l)	3758	5770	4800 ± 704	-
14.	Nitrate (mg/l)	179	212	193.5± 12.9	10
15.	Total Phosphate(mg/l)	122	221	160.70 ± 35.4	5

GROUNDWATER ANALYSIS: The groundwater of the studied area is utilized for washing, cleaning and other domestic purposes except drinking. All the water samples are collected from the handpumps near the landfill locality. The samples collected were analyzed for its physico-chemical characteristics along with heavy metal concentrations. The following table shows the results of the laboratory analysis of groundwater samples. The mean, maximum, minimum and standard deviation for each water quality parameter analyzed for all the samples are shown in (Table 4)

Table 4: Physical & Chemical Characteristics of Groundwater Samples

S.No.	Parameters	Groundwater Samples			Standards	
		Min	Max	Mean	BIS	WHO
1.	Ph	6.8	7.3	7.02±0.12	6.5-8.5	6.5-8.5
2.	TDS (mg/l)	736	2918	1308.67±447	500	1000
3.	EC (µS/cm)	1936	5230	2830.55±705	-	1400
4.	Salinity(mg/l)	1.108	3.218	1.883±0.513	-	-
5.	Chloride(mg/l)	142	1180	419.11±168	250	250
6.	Total Alkalinity(mg/l)	185	1695	541.52±304	200	200
7.	Total Hardness(mg/l)	167.5	522.5	303.33±71	200	500
8.	Calcium(mg/l)	72.5	292.5	139.28±44	75	200
9.	Magnesium(mg/l)	88.6	268.9	164.04±36	30	50
10.	Sulphate(mg/l)	76.582	170.17	132.55±23	200	250
11.	Nitrate(mg/l)	4.27	33.60	15.16±7.06	45	50
12.	Total Phosphate(mg/l)	0.018	0.513	0.222±0.117	-	-
13.	Sodium(mg/l)	123.8	874.1	341.55±149	-	200
14.	Potassium(mg/l)	107.5	420.5	187.50±71	-	200
15.	Iron(mg/l)	0.117	0.502	0.257±0.07	0.3	0.05-0.3

CORRELATION ANALYSIS FOR WATER QUALITY PARAMETERS: Correlation is a technique to assess the degree of interrelation and alliance between two variables. A correlation value of +1 indicates a perfect positive relation between two variables while -1 indicates the inverse relationship of the variables. A value of 0 shows no relationship between the variables (Kanmani & Gndhimathi, 2013). The value from 0.5 to +1 shows moderate relationship between the respective parameters. Table 4.5 represents the Pearson correlation coefficient matrix among the physical and chemical parameters evaluated from the groundwater samples near the Shivari landfill site. A fairly good correlation was observed between TDS & EC, TDS & Cl^-, EC & Cl^-, Na^+ & Cl^-, Na^+ & EC, Mg^{+2} & Ca^{+2}, showing all of them have similar source. Few parameters show moderate relationship like K & TDS, K^+ & EC, Ca^{+2} & Mg^{+2}, Na^+ & Mg^{+2}, Mg^{+2} & SO_4^{-2}, and Na^+ & K^+. Many parameters show good correlation with conductivity because conductivity increases with dissolution of metals through ion exchange oroxidation-reduction reaction in a groundwater aquifer system (Subba Rao 2002).

Table 5: Pearson Correlation coefficient matrix for water quality parameters of groundwater

	TDS	*EC*	*Cl^-*	*Mg^{+2}*	*Ca^{+2}*	*-2 SO_4*	*$-$ NO_3*	*TP*	*Na^+*	*K^+*
TDS	1									
EC	0.990767	1								
Cl^-	0.927759	0.953984	1							
Mg^{+2}	0.43306	0.452004	0.463588	1						
Ca^{+2}	0.275395	0.280074	0.321824	0.857605	1					
-2 SO_4	0.17373	0.176115	0.197736	0.725428	0.750554	1				
$-$ NO_3	-0.11929	-0.14765	-0.2166	0.074895	0.097202	-0.07678	1			

TP	0.101828	0.104404	0.02134	-0.04965	0.099693	-0.1313	-0.08335	1		
Na^+	0.941374	0.957121	0.970627	0.464059	0.290694	0.237118	-0.16699	0.03719	1	
K^+	0.667901	0.645345	0.568199	0.340243	0.320903	-0.05629	0.115491	0.151866	0.605704	1

The Pearson correlation coefficient matrix for heavy metals found in groundwater analysis of Shivari landfill area is presented in Table 5. The relationship between the heavy metals studied offer remarkable information on the sources and pathway of the heavy metals. The metals have shown that there is hardly any relativity between each others as values were neither near -1 or +1. However Cadmium and chromium has shown direct relation (r=0.982625) which means they are directly proportional to each other.

IV. CONCLUSIONS

The disposal of solid waste is made in a rampant way in the Shivari landfill site of Lucknow is major problem identified in the present study. In November 2002, the Shivari relocation outpost was created for about eleven clusters on the excuse of beautification of the city near the present disposal site due to which waste generated by these colonies was dumped in a chaotic ill mannered way.

The next greatest menace due to the Shivari landfill site is the generation of considerable quantity of leachate, which is been generated when the waste thrown in the landfill makes contact with the water through atmospheric precipitation and moisture.

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Public Health in Bhopal, Madhya Pradesh, After the Bhopal Gas Tragedy: A Long-term Analysis

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Abstract— *The Bhopal Gas Tragedy of December 2-3, 1984, is widely regarded as the world's worst industrial disaster, caused by the release of methyl isocyanate (MIC) gas from a pesticide plant owned by Union Carbide Corporation. This paper aims to analyze the long-term public health impacts on the residents of Bhopal, Madhya Pradesh, following the disaster. The study examines immediate health effects, chronic health conditions, mental health impacts, and the effectiveness of healthcare and rehabilitation efforts over the past decades.*

Keywords— ***Bhopal Gas Tragedy, Methyl isocyanate (MIC), Long-term health effects, Chronic health conditions, Mental health impacts healthcare, Rehabilitation***

INTRODUCTION

The Bhopal Gas Tragedy led to the immediate deaths of thousands of people and affected the health of hundreds of thousands. This catastrophe has had enduring public health consequences for the survivors and subsequent generations. Understanding these long-term effects is crucial for developing effective public health strategies and ensuring such tragedies do not recur.

Immediate Health Impact

The release of MIC gas led to acute exposure symptoms such as respiratory distress, pulmonary edema, and ocular damage. Initial estimates suggested 2,000 immediate deaths, but later assessments raised this number significantly. Survivors experienced acute symptoms like coughing, breathlessness, eye irritation, and gastrointestinal disturbances.

Long-term Health Effects

Respiratory Issues

Chronic respiratory diseases are prevalent among the survivors. Studies have documented high incidences of chronic obstructive pulmonary disease (COPD), asthma, and other respiratory disorders. These conditions have significantly reduced the quality of life for many residents, leading to increased morbidity and mortality rates in the affected population.

Cancer and Reproductive Health

There is evidence suggesting an increased incidence of cancers, particularly lung and breast cancer, among the exposed population. Reproductive health has also been adversely affected, with higher rates of spontaneous abortions, stillbirths, and congenital malformations reported among children born to exposed mothers.

Ophthalmic Issues

Long-term ophthalmic complications, including chronic conjunctivitis, cataracts, and corneal opacities, have been widely reported. These conditions have caused significant visual impairment among the survivors.

Psychological Impact

The psychological impact of the disaster has been profound. Survivors have exhibited high levels of post-traumatic stress disorder (PTSD), anxiety, depression, and other mental health disorders. The mental health burden has been exacerbated by the social and economic consequences of the disaster.

Healthcare and Rehabilitation Efforts

Government and NGO Interventions

In the aftermath of the disaster, the Indian government, along with various non-governmental organizations (NGOs), established numerous healthcare and rehabilitation programs. The Bhopal Memorial Hospital and Research

Centre (BMHRC) was set up to provide specialized treatment to the victims. Despite these efforts, the healthcare response has been criticized for being inadequate and poorly coordinated.

Long-term Healthcare Challenges

Long-term healthcare challenges include insufficient medical infrastructure, inadequate compensation, and a lack of specialized healthcare providers. Survivors have often faced bureaucratic hurdles in accessing healthcare services and compensation. The disparity in the quality of care between the affected population and other regions remains a significant issue.

Socioeconomic Impact

The disaster severely impacted the socioeconomic conditions of the survivors. Many families lost their primary breadwinners, leading to economic hardship. The affected population also faced stigmatization, further complicating their social integration and economic recovery.

Environmental and Genetic Consequences

Environmental contamination from the abandoned Union Carbide plant site continues to pose health risks. Soil and groundwater contamination have persisted, leading to chronic exposure to hazardous chemicals. Additionally, there is emerging evidence of genetic damage among the exposed population, which may have transgenerational effects.

Policy and Legal Framework

The disaster highlighted the need for stringent industrial safety regulations and effective disaster management policies. The legal battles for compensation and accountability have been long and arduous, with many survivors feeling that justice has not been adequately served. The incident underscored the necessity for robust international standards for industrial safety and corporate accountability.

CONCLUSION

The Bhopal Gas Tragedy has left an indelible mark on the public health landscape of Bhopal. The survivors continue to battle chronic health conditions, psychological trauma, and socioeconomic challenges. While there have been efforts to address these issues, much remains to be done to ensure comprehensive rehabilitation and justice for the victims. Moving forward, it is imperative to learn from this tragedy and implement policies that prioritize public health and safety, ensuring that such a disaster never happens again.

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Quality Assessment of Drinking Water in Modasa Town, Aravalli District, Gujarat, India

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Abstract— *This study investigates the quality of drinking water in Modasa town, Aravalli district, Gujarat, India, with the objective of evaluating its suitability for human consumption. A comprehensive assessment will be conducted, adhering to the Bureau of Indian Standards (BIS) specifications (IS 10500:2012) for drinking water potability. Water samples collected from diverse locations across Modasa, encompassing public taps, handpumps, and borewells, will undergo rigorous analysis to determine compliance with BIS standards. Moving beyond a simple binary evaluation, the study delves deeper to identify and characterize potential contaminants and their associated health risks. This in-depth analysis will encompass the evaluation of inorganic and organic chemicals, with a particular focus on elements like arsenic, fluoride, and heavy metals known to pose significant health concerns at elevated concentrations. Additionally, the research will investigate organic matter content and residual chlorine levels to understand the effectiveness of disinfection processes and identify potential interferences. By integrating the findings from the physical, chemical, and microbiological assessments, the study will provide a holistic understanding of drinking water quality in Modasa. This comprehensive analysis will pinpoint areas where water quality falls short of BIS standards, facilitating a targeted evaluation of potential health risks associated with contaminant exposure.*

Keywords— ***Drinking water quality, Water quality index, Gujarat, Aravalli district, India***

I. INTRODUCTION

The Indian state of Gujarat faces a unique challenge in ensuring access to safe drinking water for its population. Unlike some regions with mountainous landscapes, a large portion of Gujarat, particularly in the Aravalli district, consists of flat plains. This specific topography forces a significant portion of the rural population, estimated at around 90%, to rely heavily on surface water sources like rivers and streams to meet their daily water needs. With a rising demand for water due to economic growth, agricultural activities, and population increase, the need to maintain the quality of these surface water sources becomes paramount. Unfortunately, the current situation in Aravalli district regarding water quality monitoring paints a concerning picture. There is a conspicuous absence of established and regular water quality monitoring programs. This lack of data makes it challenging to develop effective

water resource management strategies that guarantee the continued suitability of these water sources for various uses, including drinking. Recognizing the urgency of addressing this critical issue, the present study embarks on a comprehensive assessment of the hydrochemical composition of drinking water sources across Aravalli district.

The research methodology employed in this study is multifaceted. It incorporates a comparative analysis of water samples collected during two distinct seasons: the pre-monsoon and post-monsoon periods. Water samples will be collected from two key locations: directly from riverine sources and from adjacent riverbank filtrate (RBF) wells. Analyzing water from both sources allows for a more nuanced understanding of how factors like seasonality and human activities impact water quality. Seasonal variations can significantly influence water quality. The monsoon season, with its heavy rainfall, can lead to increased turbidity and potential contamination from surface runoff. Conversely, the pre-monsoon period, characterized by drier conditions, might see a rise in contaminant concentrations due to reduced dilution. By analyzing samples from both periods, the study aims to capture these seasonal fluctuations and their impact on water quality.

The study design also delves into the potential influence of anthropogenic activities on water quality. The flat topography of the region can contribute to challenges in proper waste disposal. Untreated municipal waste discharged directly or indirectly into river systems can be a significant source of bacterial contamination. The presence of fecal coliform bacteria, a telltale sign of such contamination, can pose serious health risks and contribute to the spread of waterborne diseases like diarrhea, cholera, typhoid, and schistosomiasis. A crucial element of this research project involves the application of a Water Quality Index (WQI). This established tool will be employed to translate the complex water quality data obtained from the analysis of various parameters into a readily understandable format. This simplified and user-friendly output will prove instrumental on two fronts. Firstly, it will allow for a clear assessment of the suitability of these water sources for drinking purposes based on established national standards. Secondly, the WQI results will effectively communicate the findings to both the public and policymakers. By raising awareness about the current state of water quality in Aravalli district, the study aims to empower citizens and encourage policymakers to prioritize the implementation of effective water quality management strategies.

In conclusion, this study strives to fill the existing data gap regarding water quality in Aravalli district, Gujarat. By conducting a comprehensive hydrochemical assessment and utilizing a Water Quality Index, the research aims to provide a robust evaluation of the current situation. This newfound knowledge will serve as a cornerstone for developing and implementing improved water management practices within the district. Ultimately, this endeavor aspires to safeguard public health and promote sustainable water resource utilization, ensuring access to safe drinking water for the present and future generations of Aravalli district.

II. MATERIALS AND METHODS

2.1. Study Area

Aravalli district, nestled in the northern embrace of Gujarat state, India, unfolds across a sprawling landscape of approximately 5,230 square kilometers. Its geographical coordinates paint a picture of its location, situated between 29° 45' and 30° 15' North latitude and 78° 24' to 79° 23' East longitude. As per the 2011 census, a vibrant community of 6,86,527 individuals calls Aravalli district home. The district is graced by the majestic Mazum River, a vital source of water and a key tributary of the larger Mazum river system. Interestingly, the Mazum river itself is formed by the confluence of two distinct branches – the Eastern and Western Mazum – converging at the picturesque location of Sayara. Climate-wise, Aravalli district experiences an average annual rainfall of 2,180 millimeters. However, the monsoon season paints a distinct picture, concentrating roughly 90 percent of the annual precipitation within its brief but impactful period.

Delving deeper into the geological makeup of Aravalli district, we encounter two distinct types of soil: pedogenetic and transported soils. Pedogenetic soils, formed over millennia through the relentless action of atmospheric elements, physical and chemical weathering processes, and rock slides, tell a story of the land's history. These soils often derive their characteristics from their parent rocks, such as granite gneiss, schistose, and phyllite formations. Interestingly, soils formed from these parent rocks boast a high silica content, a testament to their geological origins. In contrast, soils formed from limestone are blessed with an abundance of calcium carbonate. Transported soils, on the other hand, paint a different picture. Carried and deposited by the meandering streams that flow through the district, these soils embark on a journey, eventually settling in their new locations. Among these transported soils, the brown forest soil stands out for its remarkably high organic matter content. This characteristic makes it particularly valuable for agricultural endeavors. By exploring the geographical tapestry of Aravalli district, we gain a deeper appreciation for its diverse landscape, vibrant communities, and the interplay between climatic factors and geological formations that shape the land. This understanding paves the way for further exploration of the district's ecological

richness, agricultural potential, and the unique cultural heritage that flourishes within its boundaries.

2.2. Methodology

2.2.1 Collection of water sample:

A cornerstone of the water quality assessment in Modasa city, Aravalli district, involved the meticulous selection of two crucial sampling sites. These locations serve as the primary sources of drinking water for the district's substantial population, managed and distributed by the Gujarat Jal Sansthan, the state's designated water supply department.

Following a well-defined strategy, Sayara (Mazum River) (site no.1: GPS(23.485250570846,73.354854574915) Elevation (in meters) ≈154) And Sarvodaynagar (Mazum River)(site no.2: GPS(23.463025399615,73.310733294302) Elevation (in meters) ≈168), were chosen as the sampling sites. Precise geographical positioning was essential, and a state-of-the-art Garmin GPS system (Model: GPSmap 76CSx) manufactured in Taiwan was utilized to acquire the exact coordinates for each location. Sayara boasts an elevation of approximately 154 meters above sea level, while Sarvodaynagar sits slightly higher at 168 meters.

Considering the primary objective of evaluating the water's suitability for human consumption, the sampling strategy strictly adhered to established protocols. A grab sampling technique was employed to ensure the collection of representative samples at specific times and locations. High-density polyethylene bottles, recognized for their durability and chemical resistance, were chosen from the reputable Tarson brand for sample collection. Prior to filling, each bottle underwent a rigorous rinsing process using the source water itself, repeated two to three times. This meticulous approach eliminates any potential contamination from previous contents, ensuring the integrity of the collected samples and minimizing the risk of misleading results.

For trace metal analysis, a specialized protocol was implemented. Acid-leached polyethylene bottles were used to collect these samples. Additionally, ultra-pure nitric acid (5 ml/liter) was introduced as a preservative measure. This acidification step plays a crucial role by minimizing the adsorption of metals onto the container walls and preventing precipitation through a reduction in pH to below 2. This meticulous approach ensures the collected samples retain their integrity and accurately reflect the actual metal concentrations present in the water source.

Bacteriological analysis necessitated a distinct approach. Here, sterilized Tarson bottles, covered with aluminum foil to maintain sterility, were employed for sample collection. These specific measures are essential to prevent contamination by external bacterial sources during transportation and storage.

Recognizing the importance of on-site analysis for specific parameters, pH and turbidity were measured directly at the sampling locations using calibrated instruments. However, for a broader range of parameters requiring more sophisticated equipment and controlled laboratory conditions, the collected water samples were transported at a chilled temperature of 4°C. This temperature-controlled environment was maintained within a designated sampling box. This approach helps to minimize any potential changes in the water chemistry during transport, ensuring the accuracy of the subsequent laboratory analyses.

Upon arrival at the laboratory, stringent sample preservation and physico-chemical analysis protocols were followed, adhering to the established standards outlined by the American Public Health Association (APHA). Colorimetric analysis, a well-established technique used to determine the concentration of colored dissolved substances in water, was performed using a high-performance UV-VIS spectrophotometer (Model: Pharo300) manufactured by Merck, Germany.

For the analysis of metal ion concentrations, a flame atomic absorption spectrometer (FAAS) was utilized. This specialized instrument, a Varian AA240 model sourced from a reputable Australian manufacturer, employs a technique that atomizes the sample and measures the characteristic light absorbed by the metal ions at specific wavelengths. This method provides highly accurate and reliable data on the presence and concentration of various metal ions in the water samples.

Finally, it is noteworthy that all the chemicals and reagents used throughout the analysis process were of analytical grade, procured from a trusted supplier, Merck India. Additionally, analytical grade water obtained from a Millipore water purification system (Model: Elix and Synergy) manufactured by Millipore in the USA was employed for the preparation of all standards and solutions used in the analysis. This meticulous attention to detail ensures the accuracy and reliability of the obtained results, providing a robust foundation for understanding the water quality in Modasa city.

2.2.2 Test Procedure:

1. Turbidity:

- Method: Nephelometric Method
- Apparatus:
    - Nephelometer conforming to ISO 7027:1999 "Water quality -

Determination of turbidity by nephelometry"

- Sampling bottles made of borosilicate glass or polyethylene

- Procedure:

a. Calibrate the nephelometer using the manufacturer's instructions and standardized formazin solution.
b. Collect a representative water sample in a clean, dry glass or polyethylene bottle.
c. Ensure the sample is free from air bubbles and any suspended particles settled at the bottom.
d. Pour the sample into the sample cell of the nephelometer.
e. Measure the turbidity of the sample directly using the calibrated nephelometer.
f. Report the turbidity value in Nephelometric Turbidity Units (NTU).

2. pH:

- **Method:** Electrometric Method
- **Apparatus:**
  - pH meter conforming to IS 12630 (Part 1 & 2):2010 "Electrometric pH measurements - Part 1: Specification for pH meters and combined pH electrodes; Part 2: Laboratory reference, routine and field reference methods"
  - Standard buffer solutions with pH values close to the expected pH of the sample water
- **Procedure:**
  a. Calibrate the pH meter using the manufacturer's instructions and standardized buffer solutions with pH values bracketing the expected pH of the sample water.
  b. Collect a representative water sample in a clean, dry glass or polyethylene bottle.
  c. Rinse the electrode with a portion of the sample water and discard the rinse water.
  d. Immerse the electrode in the sample and ensure good contact between the electrode and the sample.
  e. Allow the reading to stabilize on the pH meter display.
  f. Record the pH value displayed on the meter.
  g. Rinse the electrode with deionized water and store it as per the manufacturer's instructions.

3. Total Hardness:

- **Acceptable Limit:** BIS doesn't specify a single numerical limit for total hardness. However, it recommends that hardness, expressed as CaCO3 (calcium carbonate), be reduced whenever it exceeds 200 mg/L to make the water more palatable for drinking.
- **Standard Test Method:** The BIS standard references IS 3025 (Part 21) (Methods of sampling and test (physical and chemical) for water and wastewater, Part 21: Hardness) for determining total hardness. This method involves a titrimetric procedure using a standard solution of a chelating agent, typically EDTA (Ethylenediaminetetraacetic acid).

Here's a simplified explanation of the BIS method for total hardness:

1. **Sample Preparation:** A measured volume of the water sample is taken in a conical flask.
2. **Indicator Addition:** A small amount of an indicator solution, like Erichrome Black T, is added to the sample. This indicator changes color depending on the presence of free metal ions (hardness) in the water.
3. **Titration:** A standard EDTA solution of known concentration is gradually added to the sample using a burette while continuously stirring. EDTA reacts with the calcium and magnesium ions (primary contributors to hardness) in the water, forming a stable complex and removing them from solution.
4. **Endpoint Determination:** As the EDTA solution is added, the indicator color changes, signifying the point where all the metal ions have been complexed by EDTA. This endpoint signifies the total hardness of the water sample.
5. **Calculation:** The volume of EDTA solution used and its concentration are used to calculate the total hardness, typically expressed in milligrams per liter (mg/L) of calcium carbonate (CaCO3).

4. Alkalinity:

- **Acceptable Limit:** BIS doesn't specify a single limit for alkalinity. However, excessively high or low alkalinity can affect water quality. The standard recommends considering alkalinity along with other parameters for overall water quality assessment.
- **Standard Test Method:** The BIS standard references IS 3025 (Part 51) (Methods of sampling

and test (physical and chemical) for water and wastewater, Part 51: Carbonate and Bicarbonate) for determining alkalinity. This method involves a two-part titration process to differentiate between carbonate ($CO3^{2-}$) and bicarbonate ($HCO3^{-}$) alkalinity.

Here's a simplified explanation of the BIS method for alkalinity:

1. **Sample Preparation:** A measured volume of the water sample is taken in a conical flask.
2. **Phenolphthalein Titration:** A few drops of phenolphthalein indicator solution are added. This indicator changes color in the presence of free hydroxide ions (OH^{-}) associated with carbonate alkalinity. The solution is then titrated with a standard solution of sulfuric acid (H2SO4) until the pink color disappears. The volume of acid used corresponds to the carbonate alkalinity.
3. **Methyl Orange Titration:** After the first titration, a few drops of methyl orange indicator solution are added. This indicator changes color in the presence of both carbonate and bicarbonate alkalinity. The solution is again titrated with the standard sulfuric acid solution until a specific endpoint color is reached. The additional volume of acid used corresponds to the bicarbonate alkalinity.
4. **Calculation:** The volumes of sulfuric acid used in each titration and their concentration are used to calculate carbonate alkalinity and bicarbonate alkalinity, typically expressed in mg/L of CaCO3. Total alkalinity is then obtained by summing the carbonate and bicarbonate alkalinity values.

5. Calcium, Magnesium, sodium, Potassium and Iron: It is measured using **Flame Atomic Absorption Spectrometry (FAAS) (Referred to in general BIS standards)**

This instrumental technique offers a highly accurate and reliable method for measuring individual metal concentrations, including calcium and magnesium. Here's a simplified overview:

- **Sample Preparation:** The water sample might require pretreatment steps like acidification or dilution depending on the specific FAAS instrument and analysis requirements.
- **Atomization:** The prepared sample is introduced into the FAAS instrument, where it's subjected to high temperatures, causing it to atomize (convert into individual atoms).
- **Light Absorption:** The atomized sample is then exposed to specific wavelengths of light characteristic of the elements of interest (calcium and magnesium in this case). Each element absorbs light at specific wavelengths.
- **Signal Measurement:** The FAAS instrument measures the amount of light absorbed at the characteristic wavelengths for calcium and magnesium.
- **Concentration Determination:** The instrument uses a calibration curve (prepared using standard solutions with known concentrations of calcium and magnesium) to convert the measured light absorption into the actual concentration of these elements in the water sample.

6. Chlorine:

- Acceptable Limit: The BIS standard specifies a residual chlorine range of 0.2 to 1.0 mg/L for disinfected drinking water.
- Standard Test Methods: Primary method referenced by the BIS standard for measuring chlorine residual:
    - DPD Colorimetric Method (IS 3025 Part 26 - Methods of sampling and test (physical and chemical) for water and wastewater, Part 26: Chlorine, residual)

This widely used method involves adding a DPD (N,N-Diethyl-p-phenylenediamine) indicator solution to the water sample. The DPD reacts with the free chlorine present in the water, producing a colored complex. The intensity of the color is directly proportional to the chlorine concentration and can be measured using a spectrophotometer or visually compared to a color chart for qualitative estimation.

7. Fluoride:

- Acceptable Limit: The BIS standard recommends an optimal fluoride concentration of 1.0 mg/L for drinking water. However, permissible limits may vary depending on climatic conditions and potential health risks associated with excessive fluoride intake.
- Standard Test Methods: Primary method referenced by the BIS standard for measuring fluoride concentration:
    - Ion Selective Electrode (ISE) Method (Referred to in general BIS standards)

This technique utilizes an ion-selective electrode specifically sensitive to fluoride ions. When the electrode is

immersed in the water sample, the fluoride ions interact with the electrode membrane, generating a potential difference. The measured potential is directly proportional to the fluoride concentration in the water.

8. Nitrate (NO_3^-):

- Acceptable Limit: The BIS standard specifies a maximum permissible limit of 45 mg/L for nitrate in drinking water.
- Standard Test Methods: Primary method potentially applicable for nitrate measurement is **Ion Chromatography (IC):** This technique separates dissolved ions based on their interaction with a specialized column. Nitrate ions are separated from other ions in the water sample and then detected by a conductivity detector. The detector signal is then compared to a calibration curve prepared with standard solutions with known nitrate concentrations to determine the unknown nitrate concentration in the water sample.

9. **Sulfate (SO_4^{2-}):**

- **Acceptable Limit:** The BIS standard specifies a maximum permissible limit of 200 mg/L for sulfate in drinking water.
- **Standard Test Methods:** Primary method potentially applicable for sulfate measurement:
    - **Gravimetric Method (IS 3025 Part 47 - Methods of sampling and test (physical and chemical) for water and wastewater, Part 47: Sulfate)**

This traditional method involves the precipitation of sulfate ions as barium sulfate (BaSO4) through the addition of a barium chloride (BaCl2) solution. The formed barium sulfate precipitate is then filtered, dried, and weighed. The weight of the precipitate is then used to calculate the original sulfate concentration in the water sample.

10. The Bureau of Indian Standards (BIS) doesn't outline a single specific procedure for bacteriological analysis of total coliform and fecal coliform in drinking water within its specification, IS 10500:2012. However, the standard references a well-established method:

10. Methods of sampling and microbiological examination of water

This standard provides detailed procedures for the detection and enumeration of total coliforms and fecal coliforms in water samples. Here's a simplified breakdown of the key steps involved:

1. Sample Collection:

- Sterilized bottles, typically made of high-density polyethylene, are used for sample collection.
- Specific disinfection procedures are outlined for ensuring bottle sterility.
- Grab sampling is the preferred method, where a representative sample is collected from the chosen location at a specific time.
- Samples must be collected aseptically (minimizing contamination) and transported to the laboratory within a specific timeframe (typically within 24 hours with proper chilling at 4°C) for analysis.

2. Media Preparation:

- Specific culture media formulations are outlined in the standard for both total coliform and fecal coliform analysis. These media provide the necessary nutrients for bacterial growth.
- Examples of commonly used media include:
    - MacConkey Agar for total coliform: This medium allows for the differentiation of lactose-fermenting coliforms (usually pink colonies) from other lactose-fermenting bacteria (usually yellow colonies).
    - Lauryl Tryptose Broth (LTB) for total coliform: This liquid medium allows for the detection of coliforms based on gas production during fermentation.
    - Fecal Coliform confirmation media like EC Broth or M-FC Broth: These broths are used to confirm the presence of fecal coliforms from presumptive coliform colonies obtained on MacConkey Agar.

3. Membrane Filtration Technique:

- This is the preferred method for analyzing drinking water samples as per IS 1622.
- A measured volume of the water sample is filtered through a sterile membrane filter with a specific pore size (typically 0.45 micrometers).
- The membrane filter traps bacteria from the sample on its surface.
- The filter is then placed onto a specific culture medium depending on the analysis (total coliform or fecal coliform).

4. Incubation:

- The inoculated membranes are incubated at a specific temperature (typically 37°C) for a defined

period (typically 24-48 hours) to allow bacterial growth.

5. Colony Counting and Interpretation:

- After incubation, the number of colonies formed on the membrane filter is counted using a colony counter.
- The colony count is then used to calculate the Most Probable Number (MPN) of total coliform or fecal coliform bacteria per 100 ml of water sample using statistical tables provided in the standard.
- The presence or absence of total coliforms and fecal coliforms is determined based on specific criteria outlined in the standard, along with colony morphology (appearance) on the culture media.

III. RESULTS AND DISCUSSION

The detailed discussion of analysed physico-chemical characteristics of collected water samples from Aravalli district is presented under. These results are also compared with Bureau of Indian Standard IS 10500 recommended for drinking purpose.

3.1. Turbidity and pH

The turbidity values fluctuated from 1.0 to 24 NTU and7.8 to 9.8 NTU, respectively during pre- and post monsoon seasons. Site no.1 (i.e. Sayara) has higher turbidity value as 24 NTU than the permissible limit of 5NTU during pre-monsoon season. The higher turbidityvalues in water sources of Aravalli district has also been verified by the monitoring study of Govt. of India. The pH values ranged from 7.10 to 8.26 and from 7.38 to7.87 during pre- and post-monsoon seasons, respectively.The pH values in all drinking water sources were found within the recommended limit of BIS as 6.5 to 8.5.

3.2. Total Hardness and Alkalinity

The range of total hardness were found in between 41to 152 mg/l and 21 to 69 mg/l, respectively during pre and post-monsoon seasons for all the samples falling within the desirable limit of 200 mg/l of BIS. Alkalinity values in the analyzed water samples were obtained from27 to 114 mg/l and 18 to 52 mg/l, respectively during pre and post-monsoon seasons. The results show that allconcentrations were found to be within the desirable limitof 200 mg/l.

3.3. Total Dissolved Solids (TDS)

TDS values fluctuated from 68 to 236 mg/l and 49 to116 mg/l, respectively in pre- and post-monsoon seasons.TDS content in all the samples were well within the desirable range of 500 mg/l of BIS.

3.4. Calcium and Magnesium

The calcium contents in water samples ranged within 9.45 to 36 mg/l during pre-monsoon season and 4.45 to 15mg/l during post-monsoon season. The magnesium content varied from 4.28 to 15 mg/l and 1.80 to 7.39 mg/l, respectively for pre- and post-monsoon seasons. The results indicate that no site exceeded the concentration ofcalcium and magnesium from their desirable limits as per BIS 10500 of 75 and 30 mg/l, respectively.

3.5. Sodium and Potassium

The values of sodium were quite lower in analysed water samples, which fluctuated from 2.86 to 3.87 mg/land 2.62 to 6.73 mg/l, respectively in pre- and post monsoon seasons. The sodium values in all samples werewell within the prescribed limit of WHO as 20 mg/l. The potassium ion concentration oscillated within 0.88 to 1.72mg/l during pre-monsoon season and 0.39 to 2.43 mg/lduring post-monsoon season. BIS and WHO have notprescribed any limit for potassium ions in drinking water but it is useful for total ionic balance as well as important nutrient for human body. The seasonal variations for potassium ion were negligible during study.

3.6. Chloride and Fluoride

The chloride concentrations were found from 12 to 18mg/l and 8 to 12 mg/l in analysed samples during pre- andpost-monsoon seasons. Fluoride concentration ranged from 0.34 to 0.43 and 0.05 to 0.23 mg/l, respectively during pre- and post-monsoon seasons. No sample exceeded the desirable limit of 250 mg/l for chloride and1.0 mg/l for fluoride.

3.7. Nitrate and Sulphate

The values of nitrate were confined between 0.4 to 3.4and 0.6 to 1.4 mg/l, respectively during pre- and post-monsoon seasons. Nitrate concentration in water samples of all sites were well within the prescribed limit of 45 mg/l.The sulphate concentration fluctuated in a limited range of ND (not detected) to 18 mg/l in pre-monsoon season and ND to 12 mg/l in post-monsoon season. The collected concentrations of sulphate were much lower than thedesirable limit of sulphate as 200 mg/l.

3.8. Iron

In the drinking water samples, the iron content was from 0.104 to 0.364 mg/l and 0.073 to 1.777 mg/l, respectively during pre- and post-monsoon seasons. The maximum concentrations of iron as 0.364 mg/l and 1.777mg/l were recorded at Sarvodaynagar (Mazum River)sampling site no.1 during both pre- and post-monsoon seasons. These concentrations of iron were higher than the permissible limit of 0.3 mg/l, which is further confirmed by another study.

3.9. Bacteriological (Total Coliform and FecalColiform) Analysis

In the bacteriological assessment of water sources ofstudy area, total coliform were recorded from absent to160 colonies/100ml during pre-monsoon season. While in post-monsoon season, these organisms were recorded as 9 colonies/100ml at Sarvodaynagar (Mazum River) sampling location. Fecal coliform counts were found as 75colonies/100ml only at Sarvodaynagar sampling site during premonsoon season, while in post-monsoon season, all siteswere free from any fecal contamination. In the study,higher total and fecal coliform contaminations were noted only at Sarvodaynagar sampling site (Site no.1).

IV. SUITABILITY OF WATER FOR DRINKINGPURPOSE USING WATER QUALITY INDEX

Weight Arithmetic Water Quality Index Method wasemployed in determining the water Quality Index forassessing the suitability of water sources for drinkingpurpose. Such WQI has been extensively used for surfaceand groundwater quality assessment, mainly in differentregions of India and also outside. The index classifies the water quality based on the purity of sampleby using the most commonly measured water qualityparameters. This index was computed by using thefollowing steps:

In the first step, water quality parameters includingTDS, HCO3, Cl, SO4, NO3, F, Ca, Mg, Na and K wereselected to summarize the water quality, which indicatethe considerable impact in the regions.In the second step, quality rating or subindex (qi) iscomputed for each of the parameter by using the givenexpression:

$$q = V - Videal/ Vstandard - Videalx\ 100$$

Where, Vactual is the estimated value of ith parameter in the analysed water sample; Videalis the ideal value of thisparameter in pure water. The ideal value is zero for allparameters except pH =7.0 and Vstandard is the recommended standard value of ithparameter given.

In the third step, the unit weight (Wi) for each waterquality parameter was determined by using the followingformula:

$$Wi = K / Si$$

Where, Si is standard value of ith parameter recommended by BIS; K is the proportionality constant which iscalculated by using the following equation:

$$K = 1/ \Sigma 1/ Si$$

In the final step, the overall WQI is calculated by usingfollowing formula:

$$WQI = \Sigma qiWi/ \Sigma Wi$$

The water quality ratings on the basis of index value for this WQI are summarized .

The results of WQI method during pre- and post monsoon seasons are summarized. The valuesof WQI ranged from 30.52 to 37.98 during pre-monsoonseason and from 5.31 to 22.51 in post-monsoon season.

All water samples in pre-monsoon season indicate the‘Good’ water quality with ‘B’ grade, whereas in post monsoon season, all samples were of ‘Excellent’ waterquality with ‘A’ grade water. The lowering of results inpost-monsoon season shows the dilution effect of rainwater in monsoon season. Overall results conclude thatwater samples of all sites of Aravalli district were foundsuitable for drinking purpose during both pre-monsoon seasons.

V. CONCLUSION

Major drinking water sources in Aravalli district aresurface water sources. The quality of surface water variesfrom one season to another season due to the heavyrainfall of the region. The water quality of major surfacewater sources of study area has been assessed for drinkinguses by analyzing various physico-chemical and bacteriological parameters during pre- and post-monsoonseasons. The ranges of turbidity and iron are significantlyvarying in surface water and exceed the desirable as wellas permissible limits of BIS specification. Coliformcontamination in surface water is also high. Piper

diagrams indicate the dominancy of calcium, magnesiumand bicarbonate ions in all the selected samples i.e. Ca-Mg-HCO3 water type. Water Quality Index (WQI) revealsthe ‘Good’ and ‘Excellent’ water quality during pre- and post-monsoon seasons, respectively. The results of thestudy confirm the suitability of all selected water sourcesfor drinking purposes. But, regular monitoring is requiredto determine the pollution load with follow up treatmentof water toimprove the water quality, which is being usedfor drinking purpose.

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Implementation of 5'S in the warehouse of a construction company

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Abstract**—** *The 5S methodology is a Japanese management tool used to organize, clean and maintain an efficient and safe workplace. Implementing it in a construction company's warehouse can significantly improve productivity, efficiency and safety. Here's how to apply each of the 5S in this context: Seiri (Classify), Seiton (Sort), Seiso (Clean), Seiketsu (Standardize), Shitsuke (Hold), The implementation improved: Loss of time in activities, Punctual delivery with customers, Organization of the warehouse area*

Keywords**— Warehouse, Efficiency, 5S.**

I. INTRODUCTION

Here's how to apply each of the 5S in this context:

Seiri (Classify)

Objective: Eliminate the unnecessary.

Step 1: Check all materials, tools and equipment in the warehouse.

Step 2: Classify the items into three categories: necessary, unnecessary and occasionally used.

Step 3: Remove unnecessary items from the warehouse and those for occasional use should be stored in a separate and less accessible area.

Action: Create a checklist to classify materials periodically.

Seiton (Sort)

Objective: Organize what is necessary efficiently.

Step 1: Define specific locations for each type of material and tool.

Step 2: Use clear and visible labeling to identify each item and its location.

Step 3: Implement a storage system that facilitates quick access (e.g., shelving, bins, tool panels).

Action: Design a map of the warehouse indicating the locations of all items.

Seiso (Clean)

Objective: Keep the work area clean and tidy.

Step 1: Establish a regular cleaning schedule for the warehouse.

Step 2: Assign specific cleaning responsibilities to employees.

Step 3: Regularly inspect the warehouse to ensure it is kept clean.

Action: Create daily and weekly cleaning checklists.

Seiketsu (Standardize)

Objective: Establish standards to maintain the first three S's.

Step 1: Document classification, order and cleaning procedures and practices.

Step 2: Train employees in these procedures.

Step 3: Develop and display visual guides (signs, instructions, standard operating procedures) in the warehouse.

Action: Create a specific 5S procedures manual for the warehouse.

Shitsuke (Hold)

Objective: Maintain and improve 5S practices over time.

Step 1: Conduct regular audits to ensure 5S is followed.

Step 2: Foster a culture of continuous improvement and commitment to 5S among employees.

Step 3: Recognize and reward compliance and continuous improvement of 5S.

Action: Implement a suggestion and feedback system to improve warehouse practices.

Step by Step Implementation:

1) Planning and Awareness:

a. Gather the team and explain the benefits of 5S.

b. Appoint a leader or committee to oversee implementation.

2) Training:

a. Train all warehouse employees in the 5S methodology.

3) Initial Execution:

a. Carry out a massive cleaning and organization day to implement Seiri and Seiton.

4) Procedure Development:

a. Document and standardize best practices for Seiso, Seiketsu and Shitsuke.

5) Monitoring and Continuous Improvement:

a. Conduct audits and adjust procedures as necessary.

b. Promote a work environment that values and maintains 5S.

By implementing 5S in a construction company warehouse, a more organized, safe and efficient work environment can be achieved, which can result in a significant improvement in employee productivity and morale.

OBJECTIVE

Implement 5's in the warehouse area to reduce errors in the processes.

HYPOTHESIS

With the implementation of the 5's, it will be possible to identify and eliminate losses in the production processes of the case study company.

JUSTIFICATION

The project reduces worker downtime and improves the management of warehouse resources, Economic penalties are avoided for delays in delivery of work already stipulated in the contract, ranging from $50,000 pesos for each day of delay.

II. METHODOLOGY

PHASE 1: PLAN

In this first phase, the problem in the warehouse was identified, which is the loss of tools. Given this, a meeting was held with the staff to highlight the possible causes that generate the loss of materials and through that it was possible to identify what that must be worked on to solve the problem.

Procedure and description of the activities carried out.

The activities that were carried out to solve the problem are the following:

● Knowledge of the activities carried out in the warehouse area.

● Definition of the problem and solution with the personnel responsible for the area.

● Define the activities that must be carried out to reduce disorder and poor organization.

● Comparison of the different situations from the month of February to June.

● Carry out control within the area.

Knowledge of the maintenance department area

The process activities are described below, followed by the flow chart.

1. The client asks the company for a job

2. The budget is prepared by the project area and authorized.

3. The head of the purchasing department purchases the raw materials.

4. The warehouse manager receives the raw materials.

5. The assistant and warehouse manager review and control the raw materials

6. Invoice payment is made

7. Storage of raw materials.

Definition of problem and solution with responsible personnel.

Before carrying out the implementation, a work team must be formed. This stage is made up of 4 steps, which are explained below:

Step 1. Define the problem.

To have a clearer picture of the magnitude of the problem, the necessary indicators must be collected and in this way it is possible to know how much impact was had when implementing the improvements.

The case study company needs to control and manage tools and materials. Likewise, time costs and tool losses need to be reduced. Below are the company's indicators.

Indicator 1. Tool search time

Tool	Time (minutes)
Parakeet	2
Screwdriver	5
Combined keys	1
Tweezers	3
Hammers	3
Screws	15
Hydraulic material	10
Electric material	10
Safety equipment	5
Total	54

A Pareto diagram is made to detect the cause of the search time and it is identified that the main cause of lost time is due to disorder in the materials storage area with a frequency of 5.

As a result, improvements were obtained in the warehouse to benefit the company since the warehouse is the main tool for the worker, since by having order, cleanliness, verifying and classifying the material, the worker is given his work tools in order. , so that it can have better performance in its activities, it is also said that there are fewer economic losses for the company because when applying 5S there is a control that must be respected by all workers to maintain order, cleanliness and discipline in the warehouse.

In conclusion, the 5S tool is a great improvement for the warehouse area, it allows us to maintain control with the material used in the company and helps workers to have good discipline and care with the material, as well as avoid disorder, the lack of rotation of materials in order to detect and cover the greatest number of causes and see which of them affects the most. The discipline that is achieved by maintaining control in the warehouse is incredible as it favors various areas of work. It is worth mentioning that the company's management was convinced that the 5'S represent an investment of time on the part of the operators and the appearance of some activities that must be maintained over time

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Overview of the Feed Grain Market in Moldova

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Abstract— *This article provides comprehensive information on the national grain market and addresses current issues regarding its development. It analyzes statistical data depicting the current state and trends within the Moldovan grain market, including the fluctuation of grain prices over time. This analysis draws pertinent conclusions, and the primary challenges hindering the market's effective development are highlighted. The aim of the research was to analyze the formation and development of the regional feed grain market in the economic context of the Republic of Moldova. To present and analyze the information, the realities and conditions of the grain market's functioning were examined, along with the specific features of forming the regional feed grain market.*

Keywords— ***feed, grain, market***

I. INTRODUCTION

Climate change represents the most serious crisis of our time. Global warming threatens the environment, food security, slows down economic development, and global prosperity. Deep understanding and proper management of agro-climatic and soil conditions, which form the basis of agriculture, are essential for sustainable land use and food security.

In all countries around the world, agriculture is the primary sector responsible for ensuring food security for the population, while also making a unique contribution to the overall development process. Sustainable economic development is impossible without sustainable agricultural development, which, in turn, aims to contribute to improving livelihoods so that it can achieve economic goals, implement measures to protect the environment, and promote social equality. Agriculture plays a crucial role in the global economy. Its functions are wide-ranging and include ensuring food security, stimulating economic and industrial growth, reducing poverty, narrowing income inequality, providing ecological services, and structural transformations [Byerlee et al., 2010].

The outlook projects future patterns of use of key agricultural commodities such as cereals, oilseeds, roots and tubers, pulses, sugar cane and sugar beet, palm oil, and cotton, as well as livestock products including meat, dairy, eggs, and fish, along with their by-products. These projections encompass their various uses as food, animal feed, and raw materials for biofuels and industrial applications.

Throughout the process of civilization formation, humanity has mastered highly advanced agricultural technologies and is currently capable of producing both plant and animal resources quite successfully. Estimates indicate that in modern conditions, approximately 1.5 billion hectares, or 10–11% of all land surfaces on Earth, are used for agricultural crops, while together with pastures and meadows, humans utilize 23–30% of the land.

Grains and their processed products, as mass and every day consumption goods, constitute an integral part of the agri-food and feed market, forming a relatively substantial and specific environment for the development of market relations. Nearly every inhabitant, regardless of nationality, dietary traditions, socio-economic status, or income level, participates in this market environment almost daily.

II. AGRICULTURE AS A DIRECTION OF ECONOMIC GROWTH

The demographic growth of the population urgently requires a sharp (approximately threefold) increase in food production, while actual crop yields and grain output

increase on average by 20–35% over a period of 10 years. According to FAO data, the increase in gross grain output worldwide until the mid-1970s was 75% attributed to the growth in crop yields and only 25% due to the expansion of cultivated areas [Wright, 2009].

According to forecasts, by 2032, global grain production is expected to increase from the current level by approximately 320 million tons to 3.1 billion tons, primarily driven by maize and rice. It is anticipated that, similar to the last decade, this growth will occur primarily in Asian countries, accounting for about 45% of global growth. Africa is expected to contribute more to global grain production growth than in the last decade, with maize and other coarse grains being the main drivers of growth Fig.1).

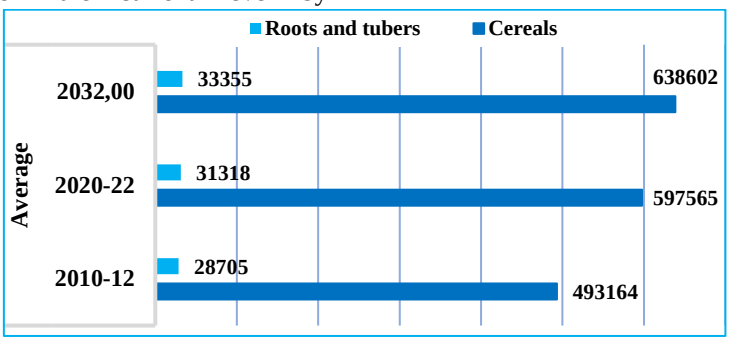

Fig.1. Regional indicators: Europe and Central Asia. Quantity produced (kt) (OECD-FAO Agricultural Outlook 2023-2032 © OECD/FAO 2023)

Latin America and the Caribbean Basin will also contribute significantly to the increase, primarily due to maize. Assuming average growing conditions in Oceania, it is not expected to maintain the record levels of production observed in the base period (OECD/Food and Agriculture Organization of the United Nations, 2023).

Global cereal production is projected to increase by 375 million metric tons (Mt), reaching 3,054 Mt by 2029, primarily due to higher yields. Maize production is expected to see the largest increase (+193 Mt), followed by wheat (+86 Mt), rice (+67 Mt), and other coarse grains (+29 Mt). Advances in biotechnology, resulting in improved seed varieties, coupled with increased use of inputs and enhanced agricultural practices, will continue to drive yield improvements (FAO Cereal Supply and Demand Brief, 2024).

However, these advancements may be tempered by the effects of climate change and associated production constraints, such as inadequate investment or land tenure issues in developing nations.

The global average cereal yield is anticipated to grow by 1.1% annually over the next decade, significantly lower than the 1.9% observed in the previous decade, while total crop area is expected to see only modest growth. These shifts are influenced by rising profitability in the Black Sea region, where production costs are comparatively lower than in other major exporting regions (OECD/FAO, 2020).

One of the most important products with a deep history in human civilization and global trade remains wheat. Currently, it is the most cultivated cereal in the world, with its planted area exceeding 220 million hectares. Developing regions account for 53% of the total harvested area and 50% of production.

Globally, the projected increase in consumption of wheat for food is more than three times larger than that for feed, especially in Asia where there is increasing demand for processed products, such as pastries and noodles. These products call for higher quality, protein rich wheat, produced in the United States, Canada, Australia and, to a lesser extent, in the European Union. Countries in the North Africa and Western Asia, such as Egypt, Türkiye, and the Islamic Republic of Iran, will remain major consumers of wheat with high levels of per capita consumption. Global production of wheat-based ethanol is expected to recover as production increases in India offsetting the reduction in other countries (OECD/Food and Agriculture Organization of the United Nations, 2023).

Wheat provides over 35% of the calories consumed from grains in developing countries, 74% in developed countries, and 41% worldwide through direct consumption. Nearly 70% of wheat is used for food, with the share for livestock feed and industrial processing accounting for 20% and 2-3%, respectively (Shiferaw, B. et al., 2013).

Wheat continues to decline in price, reaching a three-month low, as supply from the Black Sea region remains competitive. Large Russian export shipments, as well as ongoing shipments from Ukraine despite repeated Russian attacks on Ukrainian ports and grain storage facilities, have diverted attention from unfavorable weather in other wheat-exporting countries such as Canada, Australia, and Argentina, for which USDA has lowered production

forecasts for the 2023/24 season (National Statistical Office of the Republic of Moldova, 2024).

For wheat, it is anticipated that higher yields will compensate for a slight reduction in planted areas. Global production in 2024/25 is forecasted to increase by 1.2% y/y to 798.8 million tons (+9.4 million tons y/y) (Cereals market situation, 2024).

International wheat prices declined for the third consecutive month in March 2024. Favourable crop conditions in the Russian Federation and the United States of America underpinned declines of 8.9 percent and 1.4 percent, respectively, in the Russian Federation (offer, f.o.b., deep-sea ports) quotations and the benchmark United States of America (US No. 2, Hard Red Winter) values. A 5.3 percent decrease in the European Union (France, grade 1, Rouen) prices mostly reflected continued strong competition from the Russian Federation on export markets

(Food Price Monitoring and Analysis, 2024).

However, among the increased productions is Ukraine, whose harvest grew by 1.5 million metric tons to 22.5 million metric tons (previously 21 million metric tons). Additionally, Ukraine is increasing wheat exports in the new season by 0.5 million metric tons to 11 million metric tons. Wheat exports from Russia are increasing by 1 million metric tons to 49 million metric tons. While Russia's harvest remains unchanged at 85 million metric tons, many analysts believe it exceeds 90 million metric tons in reality. Turkey also sees export growth by 0.5 million metric tons (Glauber J., 2024).

The situation in the grain market (wheat and feed grains) in the 2022/23 season is somewhat ambiguous compared to the previous season. Global wheat production reached an Taking into consideration the direct feeding of cereals and the utilization of processed items like protein meal, fishmeal, cereal bran, and other related by-products in the livestock industry enables the Outlook to ascertain the sector's overall contribution to human nutrition. This approach also aids in assessing the potential ramifications of developments on global food and nutrition security.

In 2023, Moldova exported the highest volume of wheat compared to the previous three years, reaching 1,136,643 tons, with Romania becoming the primary destination, accounting for 62% of the exports. The total wheat export indicator for Moldova last year was 3.9 times higher than in 2022 (291,242 tons) and 5.3% higher than in 2021 (1,079,326 tons). However, the average export price of wheat in 2023 was the lowest in the past three years, at 3.77 lei/kg, which was 29.7% lower than in 2022 (5.39 lei/kg) and 10.5% lower than in 2021 (4.21 lei/kg). This situation

unprecedented level, and global stocks are increasing. Conversely, production of maize and other feed grains was insufficient to meet demand, leading to an expected reduction in global feed grain stocks by the end of the 2023 season. million tonnes of grains by April 2023, which helped increase supplies and alleviate some uncertainty in grain markets; however, shipments from Ukraine remain limited.

The WASDE report made new adjustments to the agricultural commodities market. Global wheat production was estimated at 787.34 million metric tons, a decrease of 6.03 million metric tons from August 2023 (793.37 million metric tons). Production declined in regions such as the European Union, down by 1 million metric tons to 134 million metric tons, Canada by 1 million metric tons to 31 million metric tons, and Australia by 3 million metric tons from 29 million to 26 million metric tons.

The IGC has released its first comprehensive forecasts for the 2024-2025 period, predicting that the total global grain production volume will increase to 2,332.2 million tons (+27.9 million or +1.2% y/y), potentially setting a new record. Taking into account new highs in key

consumption markets, total demand is forecasted at a record-high level of 2,330.7 million tons (+24.2 million or +1.1% y/y), including 767.2 million tons (+0.7%) for food, 1055.9 million tons (+1.0%) for feed, and 375.9 million tons (+0.9%) for industrial use. After several years of consecutive declines, ending stocks are expected to slightly increase to 600.8 million tons (+0.2% y/y) (IGC sees record global grains crop in 2024/25, 2024).

III. FEED GRAIN MARKET IN MOLDOVA

is not unique to Moldova but is observed in the global market as well, where grain prices were 15.4% lower than the 2022 average.

Romania became the main destination for wheat exports from Moldova, with a volume of 707,000 tons, accounting for 62% of the total exports of approximately 1.14 million tons last year. The volume of wheat exported to Romania in 2023 was 4.4 times higher than the exports to this country in 2022 (160,200 tons) and 18 times higher than in 2021 (39,700 tons). While in 2021, only 17 companies in Moldova exported wheat to Romania, this number increased 4.5 times to 77 companies in 2023.

Previously, Turkey accounted for the majority of Moldova's wheat exports, but starting from April 2023, Turkey imposed a 130% tax on grain imports, leading traders from Moldova to redirect their exports to RomaniaTop of Form (InfoMarket, 2024).

Overall, the gross agricultural output of the Republic of Moldova in all categories of farms increased by 23.6% in 2023 compared to 2022, according to preliminary estimates, at comparable prices. Meanwhile, crop production increased by 35.1%, whereas livestock production decreased by 1.9% (Gross agricultural production in 2023, (2024) (Fig. 2).

The dynamics of production for the main types of agricultural products over the past two years have shown an increase in agricultural crop production, including grains, in 2023 compared to the previous year (Table 1).

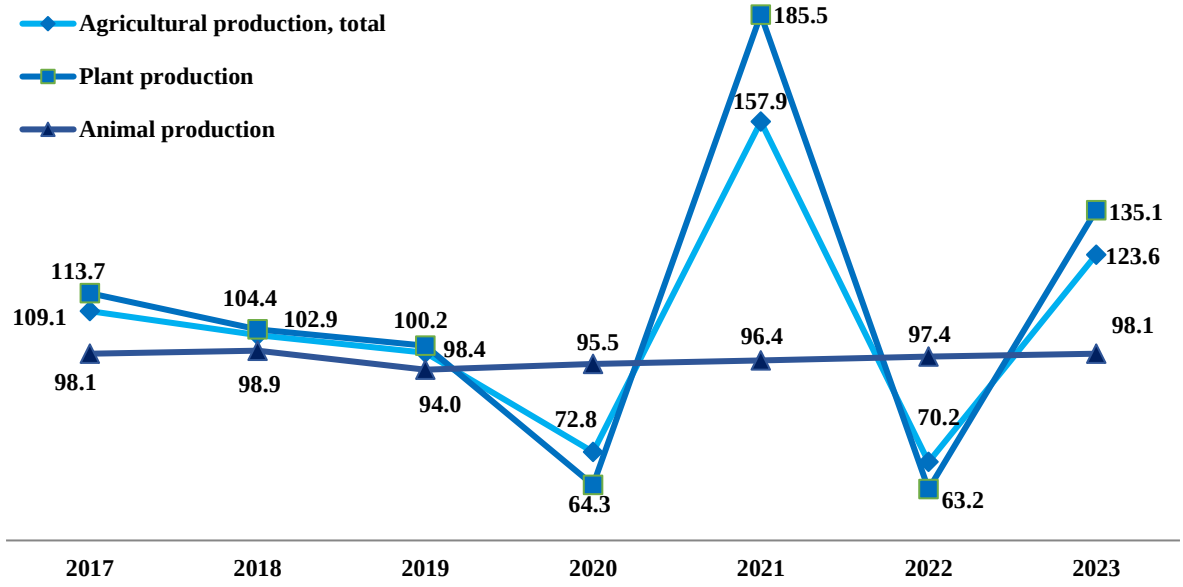

Fig.2. Dynamics of annual indicators of total agricultural production in all categories of farms in Moldova from 2017 to 2023 (the previous year is taken as 100%) (National Statistical databank, 2024).

Table 1. Production of main agricultural products in farms of all categories in Moldova

Indicators	Agricultural production, thousands of tons		Agricultural production in 2023, % of 2022	The degree of influence of agricultural products on growth (+), decrease (-) in global agricultural production in 2023 compared to 20224, %
	2022	2023		
Agricultural production - total	x	x	x	+23,6
Plant production	x	x	x	+24,2
of which the main types:				
Cereals and legumes - total	1784,4	3196,4	179,1	+14,6
from which:				
wheat	855,0	1551,7	181,5	+7,7
barley	132,7	242,6	182,8	+1,1
corn for grains	752,3	1336,9	177,7	+1,1
legumes for grains	26,3	37,7	143,2	+0,2
Soya	32,4	38,0	117,4	+0,1
Rapeseed	77,4	210,9	272,6	+3,3

The global growth in crop production is mainly driven by increased productivity rather than expansion of land use. Therefore, investments in improving yield and farm management are crucial. Assuming further progress in plant breeding and transition to more intensive production systems, it is projected that yield improvement will account for 79% of global crop production growth, expansion of arable land for 15%, and higher farming intensity for 6% over the forecast period. However, the yield of crops such as oil palm and rapeseed in major producing countries has not increased over the past decade; additional investments are needed to increase the yield of these crops.

In the Republic of Moldova, the 2023 harvest compared to 2022 is characterized by a significant increase in the production volumes of major agricultural crops: cereals and legumes increased by 79.1% (including barley by 82.8%, wheat by 81.5%, maize for grain by 77.7%, legumes for grain by 43.2%), and soybeans by 17.4% (Table 2, Figure 2, 3).

Table 2. Average yield of main agricultural crops in farms of all categories, centners per hectare

Indicators	2022	2023	2023 as a percentage of 2022
Cereals and legumes - total	20,9	33,4	159,8
din care: from which:			
Wheat	25,8	41,3	160,1
Barley	24,4	40,4	165,6
Corn for grains	17,4	28,0	160,9
Legumes for grains	9,1	10,6	116,5
Soya	13,9	15,4	110,8
Rapeseed	22,6	25,5	112,8

In 2023, agricultural enterprises produced the majority of grain and legume crops for grain, accounting for 61.5% overall (including barley - 79.6%, wheat - 76.5%, legumes for grain - 52.3%), and soybeans - 56.3%.

Additionally, 59.4% of maize for grain was produced in households and peasant (farm) households.

The shift towards consuming high-quality animal-derived food products by the population has led to a redirection of the country's grain supply from its food component to its feed component.

The reliable provision of grain and the development of its export are directly linked to the increase in production and improved utilization of grain for feed purposes, as it is primarily the feed grain consumption that drives this shift. Feed grain serves as the foundation for livestock production and constitutes the predominant raw material for the compound feed industry, thereby shaping the intersectoral proportions in the agro-industrial complex, determining the development of the entire grain market, and holding significant socio-economic importance both nationally and regionally.

The feed grain market holds a special place in the agricultural food markets system. Its level of development significantly influences the nature of the reproductive process across the entire national economy in any country. Moreover, the characteristics of feed grain as a commodity make this market unique not only in economic but also in political and social aspects.

The forecast for global consumption of feed grains in the 2023–2024 season has also been revised upward by 2.5 million tons, driven by the possible increase in maize and barley consumption for feed purposes. With the upward revision, it is projected that the total consumption of feed grains in the 2023–2024 season worldwide will reach 1,509 million tons, which is 1.5 percent higher than the level of the 2022–2023 season (The food forecast provides a brief overview of the markets, 2024).

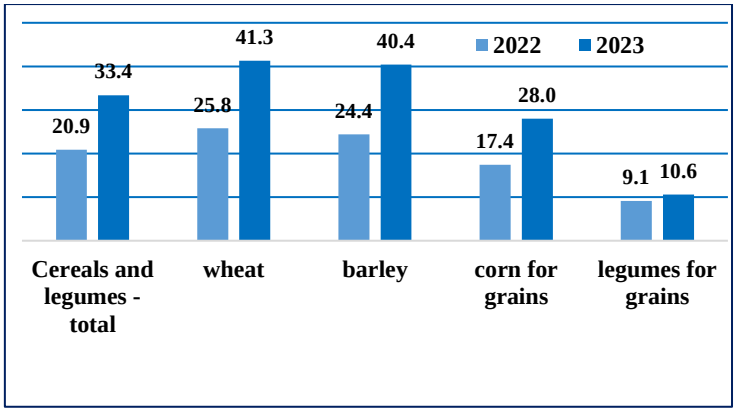

Fig.2. Yield of grains in farms of all categories in Moldova, centners per hectare

Global trade volumes of feed grains in the 2023/24 period will reach 221 million tons, which is 1.4 percent higher than in 2022/23, primarily due to increased trade in sorghum and, to a lesser extent, maize. This growth will be driven by the expected increase in purchases of all types of feed grains by mainland China, as well as the resumption of maize imports by several countries, primarily in Asia, following reduced purchases in the previous season. The recovery of sorghum and maize sales by the United States and, to a lesser extent, increased maize shipments by Brazil will contribute to the increase in global feed grain exports [Cereals market situation, 2024].

According to estimates, global sales of feed grains are expected to reach approximately $50.0 billion USD in 2024. The compound annual growth rate (CAGR) of the market is projected to be 3.4% over the forecast period, with the total valuation reaching $70.0 billion USD by 2034.

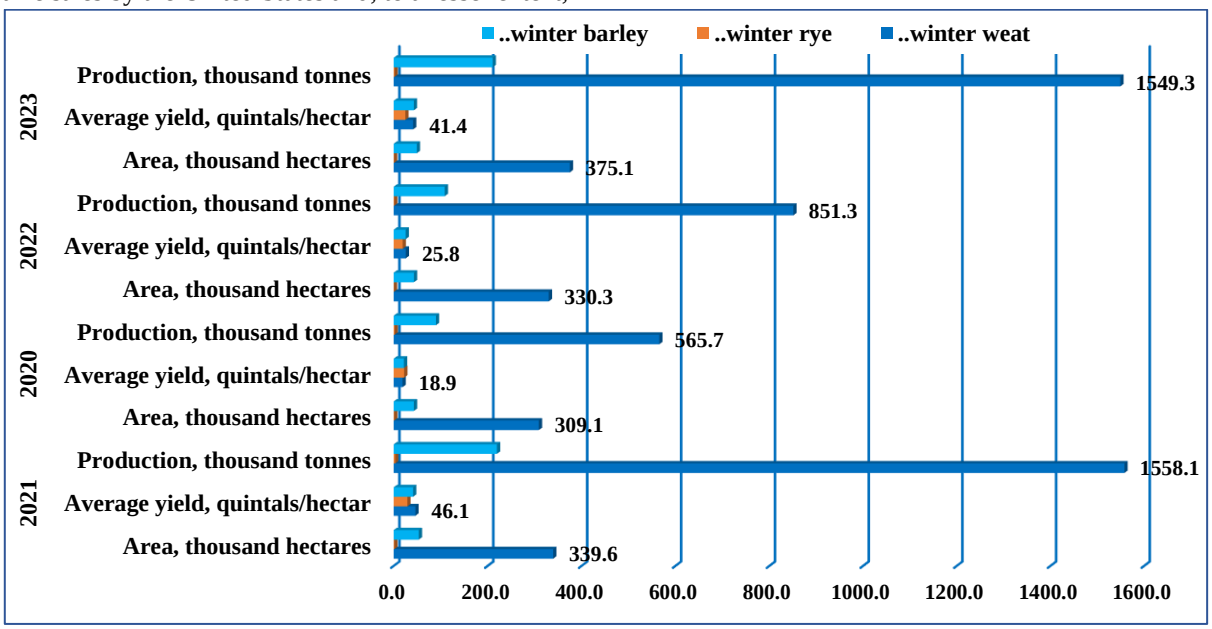

Fig.4. Production and average yield by Agricultural crops and Years in Moldova

Feed grains, including maize, wheat, barley, and sorghum, play a crucial role in animal feed production. They are rich sources of carbohydrates, proteins, and other nutrients used for feeding livestock and poultry.

With the growth of the world population, the demand for animal protein sources such as meat, eggs, and dairy products is also increasing rapidly. This, in turn, will create favorable growth opportunities for feed grain producers and suppliers.

In recent years, sustainable agriculture has also gained traction. Feed grain producers are increasingly adopting sustainable agricultural practices to maintain ecological balance and resource-efficient farming methods to minimize the environmental footprint of feed grain

cultivation. (Feed Grain Market Outlook from 2024 to 2034).

Global feed grain reserves at the end of the 2024 season are projected to reach 366 million tons, which is 3.9 percent higher than the previous year's value. An increase in corn reserves is expected, primarily in the United States, and to a much lesser extent, an increase in barley reserves among its producers. Evidence of an improvement in the supply situation in 2023/24 will be the increase in the ratio of reserves to their utilization (domestic consumption plus exports) among major exporters, from 13.0 percent in 2022/23 to 14.5 percent in 2023/24. Expanded deliveries and reduced prices will lead to a 1.7 percent increase in total feed grain consumption in 2023/24, primarily for livestock feed, followed by industrial needs and, to a lesser extent, food purposes. The increase in livestock feed consumption by 2.6 percent is driven by high demand for feed (The global food situation,2024; Statistical databank, 2024).

In 2023, the share of livestock production from the total volume of agricultural production in Moldova was 25% (compared to 69% for crops and 31% for livestock in 2022) (Table 3).

Table 3. Livestock production by main types in 2023

Indicators	Total	In % by 2022	Share (% of total)
Production (raising) of animals (in live weight) – total, thousand tons	168,2	98,6	100,0
of which:			
Agricultural enterprises	94,1	99,5	55,9
Households of the population	74,1	97,5	44,1
Milk – total, thousand tons	261,3	96,6	100,0
of which:			
Agricultural enterprises	43,3	115,1	16,6
Households of the population	218,0	93,6	83,4
Eggs - total, million pieces	585,3	95,5	100,0
of which:			
Agricultural enterprises	252,8	91,5	43,2
Households of the population	332,5	98,8	56,8

The National Bureau of Statistics of the Republic of Moldova reports that in 2023, compared to 2022, agricultural production in all categories of farms increased by 23.6% (at comparable prices). Specifically, plant production increased by 35.1%, while livestock production decreased by 1.9% (InfoMarket-22.02.2024).

To enhance the efficiency of livestock production and ensure better provision of animal-derived food products to the population, a sustainable supply of feed grains to the livestock sectors is essential. The regional feed grain market is an integral part of the national grain market and constitutes a complex multifunctional economic system.

The dynamics of producer price indices for agricultural products in Moldova over the past two years (in %, compared to the previous year) showed that Livestock production (growth) in all categories of farms decreased by approximately 1.4% in 2023 compared to 2022. The decline in production was driven by reductions in production in households (-2.5%) and agricultural enterprises (-0.5%) (Table 4) (National Statistical Office of the Republic of Moldova. Agriculture. 2024).

It is a fact that growth in total factor productivity (TFP)—the efficiency with which producers combine factors of production to produce output—has driven much of the growth in agricultural production over the past two decades, although progress has been uneven across countries and sectors. The productivity gap among farms remains large, and improving the productivity of lagging farms remains a structural adjustment challenge even for countries with high productivity scores.

*Table 4. Dynamics of agricultural producer price indices products (% of the previous year)**

Indicators	2023 as a percentage of 2022	2022 as a percentage of 2021
Agricultural products - total	82,2	113,6
Crop products	77,8	113,2
including by main types:		
Cereals and legumes - total	75,8	121,0
of which:		
Wheat	65,4	128,4
Barley	63,1	125,2
Rye	66,2	109,9
Corn for grain	83,0	109,8
Leguminous crops	109,8	123,9
Livestock products	102,7	116,0
including by main types:		
Animals (live weight) – total	102,1	114,9
of which:		
Cattle	96,0	118,8
Pigs	104,4	118,6
Poultry	100,8	110,1
Milk of all types	107,7	113,5
Food eggs	104,2	126

**Dynamics of prices of agricultural producers in 2023.03/06/2024.* (National Statistical Office of the Republic of Moldova. Agriculture. 2024)

IV. CONCLUSIONS

- The significance of the feed grain market within the agricultural food markets system cannot be overstated. Its development profoundly impacts the reproductive processes of entire national economies. Additionally, the unique characteristics of feed grain as a commodity render this market not only economically significant but also politically and socially influential. The projected increase of 2.5 million tons suggests a growing demand for feed grains worldwide. With this adjustment, it is anticipated that total consumption of feed grains in the 2023–2024 season will reach 1,509 million tons, reflecting a 1.5 percent rise compared to the previous season. This indicates sustained growth in demand for feed grains, highlighting their continued importance in sustaining livestock production and ensuring food security on a global scale.

- The agricultural sector in the Republic of Moldova experienced a substantial increase in production volumes of major crops in the 2023 harvest compared to 2022. This was especially pronounced in barley (79.6%), wheat (76.5%), and legumes for grain (52.3%), with soybeans also featuring prominently at 56.3%. Furthermore, households and peasant (farm) households were significant contributors to maize for grain production, accounting for 59.4% of the total output.

Overall, these statistics indicate a robust performance of the agricultural sector in Moldova during the 2023 harvest, driven by increased production across key crop categories, primarily facilitated by agricultural enterprises.

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Analyzing Consumer Cost Efficiency: A Quantitative Study of Travel Agency Bookings in Cabanatuan City

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Abstract— *This study investigates the consumer cost efficiency of travel agency bookings in Cabanatuan City, addressing questions regarding price competitiveness, service quality, and consumer preferences. The research employs a cross-sectional design, utilizing a survey questionnaire to gather data from 100 travelers who booked through various travel agencies in the city. Purposive sampling ensures representation across demographics and travel preferences. Statistical analysis reveals insights into consumer behavior and cost efficiency. Findings indicate that most travelers in Cabanatuan City are young, educated, and primarily female travelers, with a preference for leisure trips and family packages. In-person bookings were favored, emphasizing value- added services like travel insurance. Regarding price competitiveness, respondents perceive travel agency prices as competitive and aligned with service quality, indicating a willingness to pay for value. The transparency of fees and charges is highly valued, and the highest satisfaction is clarity regarding booking fees. Customization options for travel packages are essential, particularly in accommodation, transportation, and activities. Customer service quality, especially responsiveness and friendliness, significantly impacts overall satisfaction. In conclusion, the study concludes that travel agencies must tailor their offerings and promotions to meet diverse consumer demands, focusing on transparency, price competitiveness, and service quality to enhance customer satisfaction and loyalty. The findings underscore the importance of special offers, customizable packages, and excellent customer service in attracting and retaining customers in a competitive market. Recommendations include implementing a consumer cost efficiency plan that addresses these key factors to promote customer happiness and loyalty.*

Keywords— ***cost- efficiency; travel agency; consumer; travel promotions, online booking; travel package; customer service; transparency; accommodation; and customer service.***

I. INTRODUCTION

Tourism and hospitality play an essential role in the Philippine economy. According to the Philippine Statistics Authority (2023), the contribution of this sector to the country's gross domestic product in 2022 was 6.2%; this indicated an increase from just over five percent during the COVID- 19 pandemic years; however, it was still lower than the pre-pandemic GDP share. As the country recovered from the crisis, the hospitality and tourism industries have flourished steadily over the years. The sector encompasses many enterprises, including hotels, restaurants, travel agencies, and tour operators.

The tourism and hospitality industry is a dynamic sector that constantly adapts to changing consumer preferences and technological advancements. Cabanatuan City, nestled in the heart of the Philippines, is no exception to this trend. With an increasing number of travelers seeking cost-efficient accommodations, travel agencies play a pivotal role in assisting consumers in organizing their trips, offering plenty of options ranging from flights and accommodations to tours and transportation. Cost efficiency encompasses not only the financial aspect but also the quality of service provided by a travel agency. In the context of this research cost efficiency entails not just minimizing expenses but also maximizing the value of

services received.

Tourism Notes (2018) explains that a travel agency is one of the most critical organizations in the private sector of tourism, which plays a significant and crucial role in developing and promoting tourism in the country or at a destination. It is a travel agency that packages and processes all the attractions, accesses, amenities, and ancillary services of a country and presents them to tourists. That's why a travel agency is known as the 'image builder 'of a country.

The Philippines is one of the most visited countries because of its unique tourist attractions, majestic sights, and picturesque views. According to Planner (2023), the country was the 15th most visited country in Asia in 2023. According to the monitoring data of the Department of Tourism (DOT), a total of five million four hundred fifty thousand five hundred fifty-seven (5,450,557) international visitors entered the country from January 1st to December 31st, 2023, of which 91.80%, or the bulk of international arrivals recorded at five million three thousand four hundred seventy-five (5,003,475), are foreigners. The remaining 8.20%, or four hundred forty-seven thousand eighty-two (447,082), are overseas Filipinos who choose to stay in the country.

Regarding local travelers, Filipinos are known for being thrifty and travel enthusiasts. As stated by the study of an e-commerce firm, Picodi (2019), Filipinos are the most frugal travelers in the world. Filipinos are so frugal that they prefer to arrange their travel plans by direct booking rather than relying on travel agencies.

As described by Altexsoft (Direct Booking, n.d.), a direct booking is a reservation made directly with a service provider (which usually refers to lodging but can also relate to air tickets, car rentals, etc.) without engaging a third-party intermediary like an OTA or travel agent. Such reservations are usually made via so-called direct booking channels like a brand's website, email, social media, messaging tools, phone, etc. Attracting direct bookings is the strategic goal of most travel service providers, as it allows them to avoid resellers' commissions and thus increase revenue. Another benefit is obtaining travelers' information to create personal and other marketing activities.

Based on Picodi's (2019) study found that Filipino travelers only spend an average of ₱13,171 ($252) per person on holiday, placing the Philippines at the 39th spot out of the 41 countries covered by the report in terms of travel spending.

According to the Picodi respondents from the survey, only three percent didn't try to save on their trips; the rest of the respondents would buy tickets and book their accommodations in advance to spend less on them. Meanwhile, some 10% of those respondents rely on travel agencies to plan their trip; the other 90% would self-organize because 50% of them said it was cheaper; 48% said that they could match everything according to their preference; and 32% said it was more comfortable.

Aside from being price-conscious for Filipino and foreign visitors, convenience and quality of service are also considered when booking accommodation. According to Travel Perk (2022), a few decades ago, if people wanted to book a trip, they'd need to wander down to their local travel agent's office. After brainstorming some ideas and perhaps looking through the travel agent's catalogs, the travelers would express their preferences to the agent, who'd organize hotel and transport bookings. But today, travelers are more likely to start their trip planning process by researching destinations online and then head to an online travel aggregator to make the bookings themselves.

A 2022 survey from Travel Perk has shown that 41% of travelers now prefer using online travel agencies or aggregators to book hotels, with a further 29% booking directly and just 29% using a traditional travel agent. However, using a travel agent still has some unique benefits. Travel agents can find you exclusive fares, offer specialist expertise, and help you plan and coordinate your trip. Even today, many people seek them out for a more personalized travel experience.

In this topic, the researchers would like to quantitatively analyze consumer cost efficiency in booking travel agencies in Cabanatuan City. The study will assess consumer demographics, price, convenience, customer service, and overall satisfaction and travel agency experience in Cabanatuan City.

Objectives Of The Study

This study aims to know the cost efficiency of consumers in travel agency bookings in Cabanatuan City. The respondents of this study will be 100 travel agency consumers in Cabanatuan City.

Specifically,this study seeks to answer the following questions:

1. How may the demographic profile of the consumer be described in terms of:

1.1 Age

1.2 Gender

1.3 Civil Status

1.4 Educational Attainment

1.5 Current Occupation

1.6 *Average Monthly Income*

2. How may the cost efficiency of the travel agency consumer be describe in terms of:

2.1 Booking Preferences

2.2 Type of Trips Typically Book

2.3 Type of Travel Package

2.4 Type of Travel Trip Typically Book

2.5 Travel Booking Frequency

2.6 Value Added Services

2.7 Customization of Travel Packages

2.8 Customers Decision

2.9 *Travel Promotions*

3. How may the price competitiveness and service quality of the travel agency be describe in terms of:

3.1 Travel Promotions

3.2 Price Competitiveness

3.3 Transparency of fees and Charges

3.4 Customization Options for Travel Packages

3.5 *Customer Service Quality*

4. Is there any significance relationship between the profile of the respondents and the consumer cost efficiency of travel agencies**?**

5. What may the consumer cost efficiency plan be proposed?

II. METHODOLOGY

Research Design

This study utilizes a cross-sectional research design. Stefan Hunziker and Michael Blankenagel defined cross-sectional research design in their 2021 book Research Design in Business and Management as a research design that simultaneously involves collecting data from many different people.

According to Research, cross-sectional research observes variables without being influenced. Life (2023), a cross-sectional study is a time-saving, cost-effective, and straightforward approach for gathering preliminary data, wherein a researcher collects data at a single point in time and observes variables without influencing them. The prevalence of an outcome at a given point in time can be determined in this manner. The data collected will be through a survey questionnaire. The reason for utilizing this design is to have a clear understanding and to capture a snapshot of consumer behavior and cost efficiency at a specific time, enabling efficient comparisons across different groups and providing immediate insights into the factors influencing travel agency bookings in Cabanatuan City.

Locale of the Study

This research will specifically focus on understanding and analyzing consumer cost efficiency in the context of travel agency bookings within the geographic area of Cabanatuan City. The study encompassed visits to eight travel agencies, including Travel Agency 1, Travel Agency 2, Travel Agency 3, Travel Agency 4, Travel Agency 5, Travel Agency 6, Travel Agency 7, and Travel Agency 8. This study will target 100 consumers who have used travel agency booking services. This study aims to provide insights into how consumers in Cabanatuan City engage with travel agencies and the cost- related factors associated with their bookings.

Sample and Sampling Procedure

The sample consists of 100 customers who booked travel services through travel agencies within Cabanatuan City. This limitation was chosen to focus on understanding consumer perceptions of cost efficiency, value for money, and quality of service in the context of city travel agency bookings. These individuals will include residents and tourists who have made bookings on the travel agency. A purposive sampling method will be used to choose the respondents because it will specifically involve travel agency consumers. According to Crossman (2020), purposive sampling is a non-probability sampling method that is selected based on a population's characteristics and the study's objective. Purposive sampling is also known as judgmental, selective, or subjective sampling. The sampling procedure will involve visiting various travel agencies within Cabanatuan City to interact with and personally ask customers who have booked travel services. Total Population Sampling will be employed to choose participants from this sampling frame. Total population sampling means that a researcher examines the entire population with one or more shared characteristics. This kind of purposive sampling technique is commonly used to generate reviews of events or experiences, which is to say, it is expected to study particular groups within larger populations. (Crossman 2020) Using this sampling method ensures the representation of various demographics and travel preferences. It allows for a diverse representation of individuals in different travel agencies, comprehensively understanding their experiences and perspectives. Data collection will involve surveys with the selected participants to gather insights into their booking experiences, expenses, satisfaction levels, and perceptions of cost efficiency. This data will then be analyzed using statistical techniques to analyze the trends, patterns, and factors influencing consumer cost efficiency in travel

agency bookings in Cabanatuan City.

Research Instruments

The researcher utilized a structured survey questionnaire based on Sarah Jane M. Roldan's (2023) study on online booking purchase decisions to gather data. This questionnaire, which can be distributed through various channels and emailed to participants, was validated by travel agencies post-presentation. Participants were assured confidentiality and instructed to complete the survey calmly, with the online platform incorporating validation checks to ensure data accuracy. However, the instrument's reliance on prior travel agency experiences might exclude individuals without such experiences, limiting the generalizability of the findings. The survey consists of three parts: Part I gathers demographic information (age, gender, civil status, education, occupation, income); Part II explores cost efficiency in booking preferences, types of trips, value-added services, and influential booking factors; Part III assesses consumer perceptions of travel agency price competitiveness and service quality, including travel promotions, fee transparency, customization options, and customer service quality.

Data Gathering Procedure

The data gathering procedure for the study, "Analyzing Consumer Cost Efficiency: A Quantitative Study of Travel Agency Bookings in Cabanatuan City," employs purposive sampling, precisely a total population sampling technique, to understand consumer preferences and behaviors. Initially, specific demographic characteristics such as age, income levels, and frequency of travel are used to identify distinct segments within the population of travel agency service consumers in Cabanatuan City. This categorization allows for a targeted selection of participants representing different demographic groups, facilitating a comprehensive exploration of consumer preferences and behaviors. The next step involves developing a survey questionnaire to collect quantitative data, including questions about demographics, travel preferences, factors influencing travel agency bookings, cost considerations, and overall satisfaction. A pilot test is conducted with a small sample of respondents to identify and address any issues with the questionnaire's clarity, length, or format, and the revisions are made based on the feedback received. Major travel agencies operating in Cabanatuan City are selected to ensure the representation of different types and sizes, capturing diverse consumer experiences. To ensure validity and reliability, the findings are cross-verified with industry experts or relevant stakeholders. The survey questionnaires are administered to selected respondents using various methods, such as in-person or online surveys, based on respondent preferences, with assurances of confidentiality. Quantitative data is collected on factors influencing travel agency bookings, cost efficiency, and consumer satisfaction, with an emphasis on accurate recording and consistency in data collection methods. The collected data is analyzed using statistical tools to explore correlations between variables, identify patterns, and draw conclusions. The findings are compiled into a comprehensive report, presented with charts, graphs, and tables, and recommendations are provided based on the study's results.

Data Analysis Technique

In this research, various statistical methods will be employed to analyze the collected data. Frequency distribution tables will be used to establish the demographic profile and cost efficiency of travel agency consumers, representing the number of individuals in each category. The Likert scale will measure respondents' opinions or behavior toward factors related to travel agency bookings, providing quantitative data on consumer perceptions, preferences, and satisfaction levels. Mean scores will describe the price competitiveness and service quality of travel agencies. Spearman Rho will assess the significant relationship between respondents' profiles and cost efficiency. The Chi-square test will analyze categorical data, such as demographic details and perceived cost efficiency, to determine significant associations between these variables. These analyses will offer valuable insights into consumer behavior and preferences, aiding in the tailoring of marketing strategies.

The weighted mean was verbally describe using the the following scale:

Weighted Mean	Scale	Verbal Interpretation
3.26 - 4.00	4	Very Likely Strongly Agree Very Satisfied Excellent
2.51 - 3.25	3	Likely Agree Satisfied Good
1.76 - 2.50	2	Unlikely Disagree Dissatisfied Poor
1.00 - 1.75	1	Very Unlikely Strongly Disagree Very Dissatisfied Very Poor

III. RESULTS AND DISCUSSIONS

This part presents the findings of the study, including textual and figurative results and discussion, which involve presenting the data gathered from the survey.

1. *Socio-Demographic Profile of the Respondents*

Table 1.1 Frequency and Percentage Distribution of the Socio-Demographic Profile of the Respondents in terms of Age

Age	Frequency (f)	Percentage (%)
18-24 years old	30	30%
25-34 years old	27	27%
35-44 years old	17	17%
45-54 years old	17	17%
55+ years old	9	9%
Total	100	100%

Table 1.1 shows the social-demographic profile of the respondents in terms of age, which shows that the majority of the respondents are between 18 and 24 years old, with 30%, followed by 25–34 years old with 27%, 34–44 years old with 17%, 45–54 years old with both 17%, and lastly, 55 and older with 9%. Overall, the results indicate that the majority of travelers in Cabanatuan fall within the age range of 18 to 24 years old.

Table 1.2 Frequency and Percentage Distribution of the Socio-Demographic Profile of the Respondents in terms of Gender

Gender	Frequency (f)	Percentage (%)
Male	33	33%
Female	64	64%
Non-binary	1	1%
Prefer not to say	2	2%
Total	100	100%

Table 1.2 shows the social-demographic profile of the respondents in terms of gender, which shows that the majority of the respondents are female, with 64%, followed by male with 33%, prefer not to say with 2%, and lastly, non-binary with 1%. Overall, the results indicate that females are the ones who traveled the most in Cabanatuan City.

Table 1.3 Frequency and Percentage Distribution of the Socio-Demographic Profile of the Respondents in terms of Civil Status

Civil Status	Frequency (f)	Percentage (%)
Single	55	55%
Married	42	42%
Separated	0	0
Divorced	1	1%
Widowed	2	2%
Total	100	100%

Table 1.3 shows the social-demographic profile of the respondents in terms of civil status, which shows that the majority of the respondents are single with 55%, followed by married with 42%, widowed with 2%, and lastly, divorced with 1%; no respondents selected the separated option. Overall, the results indicate that the majority of travelers in Cabanatuan City are single.

Table 1.4 Frequency and Percentage Distribution of the Socio-Demographic Profile of the Respondents in terms of Educational Attainment

Educational Attainment	Frequency (f)	Percentage (%)
Elementary	0	0%
High School	21	21%
Bachelor's degree	65	65%
Master's degree	11	11%
Doctoral degree	2	2%
Other (please specify)	1	1%
Total	100	100%

Table 1.4 shows the socio-demographic profile of the respondents in terms of educational attainment, which shows that the majority of respondents are bachelor's degree holders at 65%. This is followed by high school graduates at 21%, master's degree holders at 11%, and doctoral degree holders at 2%. Additionally, 1% of respondents chose the "other" option, specifying hospitality management as their educational background. Overall, the

results indicate that the majority of travelers in Cabanatuan City hold a bachelor's degree.

Table 1.5 Frequency and Percentage Distribution of the Socio-Demographic Profile of the Respondents in terms of Current Occupation

Current Occupation	Frequency (f)	Percentage (%)
Employed full-time	53	53%
Employed part-time	8	8%
Self-employed	13	13%
Unemployed	5	5%
Student	13	13%
Retired	8	8%
Other (please specify)	0	0%
Total	100	100%

Table 1.5 shows the social-demographic profile of the respondents in terms of current occupation, which shows that the majority of the respondents are employed full-time, with 53%, followed by self-employed with 13%, students with 13%, employed part-time with 8%, retired with 8% and lastly, unemployed with 5%. Overall, the results indicate that most travelers in Cabanatuan City are employed full-time.

Table 1.6 Frequency and Percentage Distribution of the Socio-Demographic Profile of the Respondents in terms of Average Monthly Income

Average Monthly Income	*Frequency (f)*	*Percentage (%)*
Below Php 3,000	11	11%
Php 3,000- 5,000	6	6%
Php 6,000-10,000	14	14%
Php 11,000- 15,000	22	22%
Php 16,000 - 20,000	7	7%
Php 21,000 - 25,000	6	6%
Php 26,000 - 30,000	12	12%
Above Php 31,000	22	22%
Total	100	100%

Table 1.6 shows the socio-demographic profile of the respondents in terms of average monthly income, which shows that the majority of the respondents earn between Php 11,000 and Php 15,000 monthly, comprising 22%, followed by those earning above PHP 31,000, also at 22%. Other income brackets include Php 6,000–10,000 at 14%, Php 26,000–30,000 at 12%, below Php 3,000 at 11%, Php 16,000–20,000 at 7%, Php 21,000–25,000 at 6%, and Php 3,000–5,000, also at 6%. Overall, the results indicate that most travelers in Cabanatuan City fall into the income brackets of above Php 31,000 and Php 11,000–15,000.

2. Cost Efficiency of Travel Agency Consumers

Table 2.1 Frequency and Percentage Distribution of the Cost Efficiency of the travel Agency Consumer in terms of Booking Preferences

How do you prefer to book your travel arrangements?	Frequency (f)	Percentage (%)
Online platforms (websites, apps)	28	28%
In-person at a travel agency (walk-in)	38	38%
Over the phone	17	17%
Combination of the above	17	17%
Other (please specify)	0	0%
Total	100	100%

Table 2.1 shows the cost *efficiency of travel agency consumers* in terms of how they prefer to book their travel arrangements, which shows that the majority of the respondents prefer in-person bookings at a travel agency (walk-in) with 38%, followed by online platforms (websites, apps) with 28%, over the phone with 17%, and a combination of the above with both 17%. Overall, the results indicate that most consumers of travel agencies in Cabanatuan prefer to book in person (walk-in). Although phone reservations are less usual, online platforms are still widely used.

Table 2.2 Frequency and Percentage Distribution of the Cost Efficiency of the travel Agency Consumer in terms of Type of Trips Typically Book

What type of trips do you typically book?	Frequency (f)	Percentage (%)
Leisure/Vacation	50	50%
Business	23	23%
Adventure (Trekking, Diving, Hiking, etc.)	17	17%

Cultural/Heritage	8	8%
Other (please specify)	2	2%
Total	100	100%

Table 2.2 shows the cost efficiency of travel agency consumers in terms of what types of trips they typically book, which shows that the majority of the respondents prefer to book for leisure or vacation with 50%, followed by business trips with 23%, adventure trips like trekking, diving, hiking, etc. with 17%, cultural or heritage trips with 8%, and lastly, 2% prefer other types of trips, which are educational tours and visiting relatives. Overall, the results indicate that most consumers of travel agencies in Cabanatuan prefer to book leisure or vacation trips.

Table 2.3 Frequency and Percentage Distribution of the Cost Efficiency of the Travel Agency Consumer in terms of Type of Travel Package

What package or combos do you typically book?	**Frequency (f)**	**Percentage (%)**
Solo (Individual)	10	10%
Couple	12	12%
Family	57	57%
Barkadas (Friends)	8	8%
Group	10	10%
Other (please specify)	3	3%
Total	100	100%

Table 2.3 shows the cost efficiency of travel agency consumers in terms of what packages or combos they typically book, which shows that the majority of the respondents prefer to book family packages with 50%, followed by couple packages with 12%, solo or individual packages with 10%, group packages with 10% also, barkadas or friends packages with 8%, and lastly, 3% chose the ‘’others’’ option and answered all of the above, meaning they book mostly all types of packages. Overall, the results indicate that most consumers preferred family packages.

Table 2.4 Frequency and Percentage Distribution of the Cost Efficiency of the Travel Agency Consumer in terms of Type of Travel Trip Typically Book

What travel trip do you typically book?	**Frequency (f)**	**Percentage (%)**
Local or Domestic Travel Trip	47	47%
Foreign or International Travel Trip	53	53%
Total	100	100%

Table 2.4 shows the cost efficiency of travel agency consumers in terms of what travel trips they typically book, which shows that most respondents prefer to book foreign or international travel trips at 53%, followed by local or domestic travel trips at 47%. Overall, the results indicate that most customers of travel agencies in Cabanatuan City prefer to book foreign or international travel trips

Table 2.5 Frequency and Percentage Distribution of the Cost Efficiency of the Travel Agency Consumer in terms of Travel Booking Frequency

How often do you book travel Arrangements in a year?	**Frequency (f)**	**Percentage (%)**
Once a year	34	34%
2-3 times a year	38	38%
4-6 times a year	17	17%
More than 6 times a year	11	11%
Total	100	100%

Table 2.5 shows the cost efficiency of travel agency consumers in terms of how often they book their travel arrangements in a year, which shows that the majority of the respondents traveled 2-3 times a year with 38%, followed by once a year with 34%, 4-6 times a year with 17%, and lastly, more than six times a year with 11%. Overall, the results indicate that most customers of travel agencies in Cabanatuan City book their travel arrangements 2-3 times a year.

Table 2.6 Frequency and Percentage Distribution of the Cost Efficiency of the Travel Agency Consumer in terms of Value Added Services

What value-added services do you find most appealing when booking with /a travel agency	**Frequency (f)**	**Percentage (%)**
Travel insurance	49	49%
Airport transfers	15	15%
Special amenities (e.g., Breakfast, free parking)	30	30%

Other (please specify)	6	6%
Total	100	100%

Table 2.6 shows the cost efficiency of travel agency consumers in terms of what value-added services they find most appealing when booking with a travel agency, which shows that the majority of the respondents prefer travel insurance, with 49%, followed by special amenities such as free Wi-Fi, complimentary breakfast, free parking with 30%, airport transfers with 15%, and lastly, 6% choose the ''others'' option and mentioned other value-added services such as restaurants, airfare, hotels, and tours, all in a package tour, service of the staff, customer service, and tour complete package. Overall, the results indicate that most consumers preferred travel insurance as the most appealing value-added service when booking with travel agencies in Cabanatuan City.

Table 2.7 Frequency and Percentage Distribution of the Cost Efficiency of the Travel Agency Consumer in terms of Customization of Travel Packages

What aspects of a travel package are you most likely to customize?	**Frequency (f)**	**Percentage (%)**
Accommodation	48	48%
Transportation	19	19%
Activities and Excursions	21	21%
Dining options	11	11%
Other (please specify)	1	1%
Total	100	100%

Table 2.7 shows the cost efficiency of travel agency consumers in terms of what aspects of a travel package they are most likely to customize, which shows that the majority of the respondents prefer accommodation with 48%, followed by activities and excursions with 21%, transportation with 19%, dining options with 11%, and lastly, 1% chose the ''others'' option and answered all of the above, meaning they are likely to customize all aspects of a travel package when booking. Overall, the results indicate that most consumers preferred accommodation as an aspect of a travel package they were most likely to customize when booking with travel agencies in Cabanatuan City.

Table 2.8 Frequency and Percentage Distribution of the Cost Efficiency of the Travel Agency Consumer in terms of Customers Decision

What factors influence your decision to choose a travel agency for bookings?	**Frequency (f)**	**Percentage (%)**
Price competitiveness	29	29%
Reputation of the travel agency	15	15%
Past experiences with the travel agency	16	16%
Recommendations from friends/ family	18	18%
Availability of travel promotions	20	20%
Other (please specify)	2	2%
Total	100	100%

Table 2.8 shows the cost efficiency of travel agency consumers in terms of what factors influence their decision to choose a travel agency for bookings, which shows that the majority of the respondents prefer to book because of price competitiveness 29%, followed by availability of travel promotions with 20%, recommendations from friends or family with 18%, past experiences with the travel agency with 16%, reputation of the travel agency with 15% and lastly, 2% chose the ''others'' option, which mentioned other factors such as convenience and accommodating customer service to all inquiries. Overall, the results indicate that most consumers preferred to book with a Cabanatuan City travel agency because of price competitiveness.

Table 2.9 Frequency and Percentage Distribution of the Cost Efficiency of the Travel Agency Consumer in terms of Travel Promotions

What types of travel promotions are most appealing to you?	**Frequency (f)**	**Percentage (%)**
Percentage discounts	29	29%
Buy one, get one free	15	15%
Exclusive package deals	52	52%
Loyalty rewards	4	4%
Other (please specify)	0	0%
Total	100	100%

Table 2.9 shows the cost efficiency of travel agency consumers in terms of what types of travel

promotions are most appealing for them, which shows that the majority of the respondents prefer exclusive package deals with 52%, followed by percentage discounts with 29%, buy one, get one free with 15%, and lastly, loyalty rewards with 4%. Overall, the results indicate that exclusive packages are the most appealing travel promotions for consumers of travel agencies in Cabanatuan City.

3. Price Competitiveness and Service Quality Of the Travel Agency

Table 3.1 Perception of the Respondents in terms of Travel Promotions

Statement	Mean	Verbal Interpretation	Rank
1. How likely are you to be influenced by travel promotions when choosing a travel agency?	3.42	VL	3
2. How likely are you to consider a travel agency's promotions when planning your trip?	3.46	VL	2
3. How likely are you to consider booking through a travel agency that offers exclusive promotions and discounts?	3.53	VL	1
Total Mean	3.47	Very Likely	

Legend: 3.26 – 4.00 Very Likely; 2.51 – 3.25 Likely; 1.76 – 2.50 Unlikely; and 1.00 – 1.75 Very Unlikely

Table 3.1 shows the significant impact of exclusive promotions and discounts on the likelihood of respondents booking through a travel agency, with a mean score of 3.53 indicating a "Very Likely" response. The strong inclination to consider travel agency promotions, with mean scores of 3.46 and 3.42, also falls under the "Very Likely" category. These scores demonstrate that promotional offers are crucial in the trip-planning phase and significantly influence the decision-making process. The overall average mean of 3.47 underscores a consistently high likelihood of respondents being swayed by travel promotions. This emphasizes the importance of promotional strategies in attracting customers and shaping their choices, indicating that travel agencies should prioritize exclusive deals and discounts in their marketing efforts to capture and retain customers effectively.

Table 3.2 Perception of the Respondents in terms of Price Competitiveness

Statement	Mean	Verbal Interpretation	Rank
1. I compare prices across different travel agencies before making a booking.	3.34	SA	3
2. The prices offered by travel agencies are competitive and worthy compared to other booking options.	3.36	SA	1
3. The prices charged by travel agencies align with the quality of the service they provide.	3.35	SA	2
Total Mean	3.35	Strongly Agree	

Legend: 3.26 – 4.00 Strongly Agree; 2.51 – 3.25 Agree; 1.76 – 2.50 Disagree; and 1.00 – 1.75 Strongly Disagree

Table 3.2 reveals that most respondents perceive travel agency prices as competitive and worthwhile compared to other booking options, with a mean of 3.36, which indicates "Strongly Agree." This suggests consumers find these prices attractive and influential in their decision-making. Additionally, the statement "The prices charged by travel agencies align with the quality of the service they provide," with a mean of 3.35 ("Strongly Agree"), indicates consumers see a correlation between price and service quality, valuing higher prices for better service. The statement "I compare prices across different travel agencies before making a booking," with a mean of 3.34 ("Strongly Agree"), shows a strong tendency among respondents to compare prices before booking. Overall, the average mean of 3.35 across all statements reflects a consistent and strong agreement on the competitiveness and quality alignment of travel agency prices. This underscores the significance of competitive pricing and service quality alignment in shaping customer decisions and highlights the positive perception of travel agencies' pricing strategies.

Table 3.3 Perception of the Respondents in terms of Transparency of Fees and Charges

Statement	Mean	Verbal Interpretation	Rank
Travel agencies' transparency in disclosing hidden fees during the booking process.	3.28	VS	3
The clarity of information regarding booking fees provided by the travel agency.	3.47	VS	1
The transparency of the travel agency regarding additional charges such as service fees, taxes, and insurance.	3.42	VS	2
Total Mean	3.39	*Very Satisfied*	

Legend: 3.26 – 4.00 Very Satisfied; 2.51 – 3.25 Satisfied; 1.76 – 2.50 Dissatisfied; and 1.00 –1.75 Very Dissatisfied

Table 3.3 illustrates the price competitiveness and service quality of the travel agency with respect to the transparency of fees. The statement "The clarity of information regarding booking fees provided by the travel agency" achieved the highest mean score of 3.47, indicating "Very Satisfied" and suggesting respondents are highly satisfied with the clarity of booking fee information. Following this, the statement "The transparency of the travel agency regarding additional charges such as service fees, taxes, and insurance" received a mean score of 3.42, also categorized as "Very Satisfied," reflecting a positive perception of transparency in additional charges. The statement "The transparency of travel agencies in disclosing any hidden fees during the booking process" scored 3.28, still within the "Very Satisfied" range, indicating general satisfaction but with potential for improvement in disclosing hidden fees. The overall average mean of 3.39 falls under "Very Satisfied," highlighting a positive perception of fee transparency among respondents. These findings suggest that while there is high satisfaction with clarity on booking fees and additional charges, enhancing transparency regarding hidden costs could further improve customer satisfaction and trust in travel agencies.

Table 3.4 Perception of the Respondents in terms of Customization Options for Travel Packages

Statement	Mean	Verbal Interpretation	Rank
The option to choose specific accommodation types (e.g., hotels, resorts, Airbnb) in my travel package is important.	3.59	SA	1
The ability to customize the transportation mode (e.g., flights, trains, buses) in my travel package is important.	3.59	SA	1
The option to choose specific activities and excursions in my travel package is important.	3.59	SA	1
Total Mean	3.59	Strongly Agree	

Legend: 3.26 – 4.00 Strongly Agree; 2.51 – 3.25 Agree; 1.76 – 2.50 Disagree; and 1.00 –1.75 Strongly Disagree

Table 3.4 demonstrates the travel agency's price competitiveness and quality of service, focusing on customization options for travel packages. All three statements regarding customization options received an identical mean of 3.59, indicating unanimous "Strongly Agree" responses from respondents. The statements emphasized the importance of choosing specific accommodation types (e.g., hotels, resorts, Airbnb), customizing transportation modes (e.g., flights, trains, buses), and selecting particular activities and excursions, all with a mean of 3.59. This consistent agreement highlights the respondents' strong preference for tailored travel experiences, suggesting that offering diverse customization options significantly enhances customer satisfaction and loyalty.

Table 3.5 Perception of the Respondents in terms of Customer Service Quality

Statement	Mean	Verbal Interpretation	Rank
The ease of finding relevant travel options on the agency's website or platform.	3.44	E	3
Availability and responsiveness of customer support and the staff to	3.54	E	1

inquiries.			
The friendliness and courtesy of staff during the booking process.	3.48	E	2
Total Mean	3.49	Excellent	

Legend: 3.26 – 4.00 Excellent; 2.51 – 3.25 Good; 1.76 – 2.50 Poor; and 1.00 – 1.75 Very Poor

Table 3.5 examines respondents' perceptions of customer service quality in three key areas, categorized as Excellent, Good, Poor, and Very Poor, with weighted means and rankings. "Availability and responsiveness of customer support" received the highest mean of 3.54, indicating prompt and effective service. "Friendliness and courtesy of staff during booking" followed with a mean of 3.48, highlighting professional and warm interactions. "Ease of finding travel options on the website" ranked third with a mean of 3.44, suggesting an efficient and user-friendly platform. The average mean of 3.49 falls under "Excellent," reflecting consistently high ratings for the travel agency's customer service. In conclusion, Travis Vu (2021) asserts that service quality and customer satisfaction are key drivers of purchase intentions, with excellent service enhancing customer loyalty and long-term relationships.

4. Significant Relationship Between The Profile Of The Respondents and the Consumer Cost Efficiency of Travel Agencies

Table 4.1 Findings of the significant relationship between the profile of the respondents and the consumer cost efficiency of travel agencies

Profile	Chi-Square	Preference	Booking	Package	Travel Trip	Frequency	Value Added	Customized	Decision	Promotions
Age	2	16.39	23.64	24.99	**23.83**	19.60	**23.72**	25.22	11.89	30.31
	p	.174	.098	.202	**.000**	.075	**.022**	.066	.455	.065
Sex	2	5.65	11.87	20.63	4.391	6.03	13.95	14.51	9.62	4.16
	p	.774	.456	.149	.222	.739	.124	.269	.843	.901
Status	2	14.93	9.68	23.81	**19.49**	15.28	6.45	11.50	13.52	5.15
	p	.093	.644	.068	**.000**	.084	.695	.489	.562	.821
Education	2	8.97	13.24	12.61	**13.14**	**21.95**	17.04	13.50	13.97	10.42
	p	.704	.655	.893	**.011**	**.038**	.148	.636	.832	.578
Occupation	2	20.24	**40.94**	20.27	**21.62**	9.88	23.62	25.67	17.646	22.575
	p	.163	**.004**	.732	**.001**	.827	.072	.177	.857	.094
Income	2	**34.56**	25.34	44.67	**21.96**	32.53	**35.12**	35.34	44.19	22.79
	p	**.032**	.609	.127	**.003**	.052	**.027**	.160	.137	.355

A comprehensive analysis was conducted to explore the relationship between respondents' profiles and the consumer cost efficiency of travel agencies. The analysis utilized Chi-square tests across various demographic variables, including age, sex, status, education, occupation, and income, in relation to respondents' preferences for different aspects of travel agency services.

The results revealed several noteworthy findings. First, concerning age, statistically significant associations were observed with travel trip frequency (p = .000), indicating that different age groups exhibit varying frequencies of travel. Additionally, age showed potential associations with preferences such as booking (p = .098), package deals (p = .202), and customized trips (p = .066), although these associations did not reach statistical significance at the specified threshold.

According to Ismail et al. (2021), age has no significant impact on the selection of Langkawi as a tourist destination. This suggests that promotion strategies can be diversified to cater to various age demographics, as younger and older tourists exhibit similar evaluations of the destination.

Second, the analysis of sex demonstrated few significant associations, with only package deals (p = .149) showing a potential association that did not reach statistical

significance. This suggests that gender may not strongly influence preferences for travel agency services.

In the analysis study of Berić et al. (2019), it was observed that there is no statistically significant correlation between gender and perceived image when it comes to traveling, and the perception of Serbia did not show any statistically significant variations in how men and women view these images. Additionally, the association's impact on image did not significantly differ between men and women, but differences were noted in scores related to positive, negative, and neutral associations. Another study by Li & Yang (2014) further affirms that gender does not play a role in tourists' selection of destinations. The study revealed no significant disparities based on gender in the connections between destination image, satisfaction levels,and behavioral intentions.

Third, respondents' status displayed significant associations with several preferences, including travel trip frequency (p = .000), package deals (p = .068), and decision-making processes (p = .084). This suggests that individuals' status may influence their preferences for various aspects of travel agency services.

According to Kara, N. & Mkwizu, K. H. (2020), a study revealed a slight variation in intellectual travel motivations among solitary leisure tourists. The research found that single leisure travelers showed a strong inclination to travel for philosophical reasons. Similarly, Fan et al. (2015) conducted a study comparing the motivations and intentions of cruise passengers with different demographic backgrounds in China. Their findings indicated that travelers from diverse demographic backgrounds have differing travel motivations. For instance, singles exhibited higher average values for travel motivations such as nature discovery and exploration than married individuals. The researchers suggested that singles may have more time and freedom to engage in new, thrilling experiences than married travelers. This underscores that the marital status of respondents could impact their travel choices.

Fourth, education exhibited potential associations with travel trip frequency (p = .011) and value-added services (p = .038), indicating that individuals with different educational backgrounds may have distinct preferences in these areas.

As per the research conducted by Zhao and Yuan (2023), the educational level is a crucial element and a commonly utilized measure of population quality. The configuration of residents' educational levels can indicate the distinct features of the local populace. On an individual level, educational experiences substantially shape living habits and cognitive processes, potentially resulting in variations in travel behaviors and preferences among different educational strata. Consequently, educational background may significantly affect individuals' choices regarding travel destinations.

Fifth, occupation showed significant associations with booking (p = .004), customized trips (p = .072), and decision-making processes (p = .177), suggesting that occupation may play a role in shaping preferences for these aspects of travel agency services.

According to Ferreira et al. (2017), it is conceivable that self-employed individuals predominantly travel internationally to participate in business events, while retired individuals travel internationally to partake in family events such as weddings and family gatherings, for instance, when a grandchild is born, or their children celebrate their fiftieth birthday. The individual's employment profile influences their destination choice and the specific attributes they seek. These findings guide travel agents in tailoring destination marketing strategies based on the tourist's employment profile.

Finally, income demonstrated significant associations with booking (p = .032), travel trip frequency (p = .003), value-added services (p = .027), and decision-making processes (p = .160). This suggests that income level may significantly impact various preferences related to travel agency services.

According to the research conducted by Veternik and Gogola (2017), household income level plays a significant role in influencing the travel behavior of the population. Numerous studies have demonstrated that individuals or households with lower incomes tend to allocate less money for travel than those with higher incomes. This implies that individuals or families with higher incomes can travel more frequently and for longer durations due to their ability to invest more money. Thus, the income acquired by individuals directly impacts the travel patterns of consumers.

In summary, the analysis highlights the nuanced relationship between respondents' profiles and their preferences for different aspects of travel agency services. Understanding these associations can be crucial for travel agencies in tailoring their services to meet the diverse needs and preferences of their clientele.

Table 5.1 Consumer-Cost Efficiency Plan: Enhancing Travel Agency Services

Objectives	Key Strategies	Timeline	Person Involved	Budget Allocation	Implementation Plan
Increase Promotion Awareness	Implement targeted marketing campaigns highlighting exclusive promotions and discounts.	3 months	Marketing Team, Social Media Manager	PHP 30,000	✓ Run social media ads and email campaigns: Utilize social media platforms and email marketing tools. ✓ Collaborate with influencers and local media: Identify and partner with relevant influencers and media outlets.
Improve Customer Service Quality	Enhance training programs for staff to improve responsiveness, friendliness, and courtesy.	1-2 months	HR Manager, Training Coordinator	PHP 10,000	✓ Conduct customer service workshops: Hire external trainers to conduct sessions. ✓ Monitor and evaluate staff performance regularly: Implement feedback and evaluation systems.
Optimize Travel Packages	Provide more customization options for travel packages, including accommodations, transportation, and activities.	1-2 months	Product Development Team	PHP 10,000	✓ Survey customers for preferred package components : Use online surveys and feedback forms. ✓ Develop flexible package options: Design packages based on survey results. ✓ Launch new packages: Promote through all marketing channels.
Increase Transparency in Pricing	Ensure clear communication of booking fees and additional charges to customers.	1-2 month	Finance Team, Customer Service Team	PHP 5,000	✓ Update website with detailed pricing information: Ensure all fees and charges are clearly listed. ✓ Train staff on transparency protocols: Conduct training sessions focused on clear communication.
Promote Value-Added Services	Highlight appealing value- added services such as travel insurance, special amenities, and airport transfers.	5 months	Marketing Team, Sales Team	PHP 30,000	✓ Create informational materials: Develop brochures, flyers, and online content. ✓ Train staff on upselling techniques: Conduct upselling workshops. ✓ Run promotional campaigns: Highlight value-added services in all promotional activities.

Enhance Customization Options	Offer a wide range of customizable options for travel packages to meet individual preferences.	1-2 months	Product Development Team	PHP 10,000	✓ Research market trends: Continuously analyze market data. ✓ Develop and test new customization options: Prototype and pilot new features. ✓ Launch new features: Promote through all available channels.
Monitoring and Evaluation: ✓ Regularly track key performance indicators (KPIs) such as customer satisfaction, booking rates, and revenue growth. ✓ Conduct quarterly reviews to assess progress and make necessary adjustments. ✓ Gather continuous feedback from customers to refine and improve strategies.					

The Consumer-Cost Efficiency Plan for enhancing travel agency services is a comprehensive strategy aimed at improving various facets of the agency's operations to provide better value and experiences for customers. The plan's objectives include increasing promotion awareness, improving customer service quality, optimizing travel packages, increasing pricing transparency, promoting value-added services, and enhancing customization options. Each objective is supported by key strategies, a timeline, responsible personnel, budget allocations, and a detailed implementation plan.

To increase promotion awareness, the agency will implement targeted marketing campaigns over three months, with a budget of PHP 30,000. The marketing team and social media manager will run ads and email campaigns on various platforms. Additionally, the agency will collaborate with influencers and local media to boost reach and engagement. To improve customer service quality, the HR Manager and Training Coordinator will enhance training programs within 1-2 months, allocating PHP10,000 for customer service workshops and regular performance evaluations.

Optimizing travel packages involves offering more customizable options for accommodations, transportation, and activities. The product development team, with a budget of PHP 10,000, will survey customers and develop flexible packages based on their preferences. Transparency in pricing will be improved within 1-2 months by the finance and customer service teams, who will update the website with detailed pricing information and train staff on clear communication protocols. Promoting value-added services such as travel insurance and exceptional amenities will take five months, with the marketing and sales teams developing informational materials and running promotional campaigns with a budget of PHP 30,000. Enhancing customization options will also be a 1-2 month effort by the product development team, focusing on researching market trends, developing new features, and launching them with appropriate promotion.

Monitoring and evaluation are integral to the plan, involving the regular tracking of key performance indicators such as customer satisfaction, booking rates, and revenue growth. Quarterly reviews will assess progress, and continuous customer feedback will be gathered to refine and improve strategies. By focusing on these strategies, the travel agency can enhance cost efficiency for consumers while maintaining competitive pricing and high service quality, ultimately fostering customer satisfaction and loyalty.

IV. CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Through a quantitative study, this paper explored the consumer cost efficiency of travel agency bookings in Cabanatuan City. The study concludes that young, educated, and primarily female solo travellers dominate the modern travel scene. This pattern is becoming more popular as it emphasizes the growing significance of educational experiences in influencing travel behaviour and a shift toward solitary exploration.

Secondly, the study also emphasizes travel agency consumers' diverse tastes and booking behaviours, revealing a strong preference for leisure trips and family packages and an affinity for in-person bookings. It shows the importance of value-added services such as travel insurance and the impact of pricing competitiveness on consumer choices. Travel agencies must grasp these dynamics to appropriately tailor their offerings and promotions to their clients' diverse demands and boost consumer satisfaction and loyalty.

A comprehensive analysis of respondent profiles

and preferences reveals that demographic variables such as age, education, occupation, income, and status significantly influence travel preferences. While age plays a significant role in travel frequency, demographic factors also affect booking behaviours, package preferences, and customized travel choices, though with varying statistical significance. Moreover, there are notable correlations between respondents' income, occupation, and education levels and specific preferences, emphasizing the importance of considering socioeconomic factors when catering to a diverse clientele. This study underscores the importance of a forward-thinking approach for travel agencies, particularly in personalizing services using demographic data to enhance client satisfaction and adapt to evolving consumer needs.

The Consumer-Cost Efficiency Plan outlines a coherent strategy for enhancing travel agency services while reducing consumer costs through meticulous analysis and strategic planning. To meet the demands of Millennial consumers and remain competitive, the travel agency will leverage digital transformation, customization enhancements, promotional offers, price competitiveness, transparency, and exceptional customer service. Implementation within the proposed six-month timeframe, with ongoing review and adjustments, ensures agility in response to shifting market trends and customer preferences. The plan anticipates significant increases in online bookings, customer satisfaction, and overall service quality, supported by key stakeholders or business partners and allocated financial resources. The travel agency can secure a lasting competitive advantage by employing a research-based approach while achieving immediate success.

The study concludes that the importance of travel agencies being transparent, competitively priced, and providing high-quality services affects consumers' perceptions of them. It highlights how consumers are drawn to special offers and discounts and need a reasonable price consistent with high-quality service. The study also emphasizes the importance of customizable travel packages and the necessity for charge disclosure openness.

Additionally, it emphasizes the importance of delivering high- quality customer service, particularly in responsiveness, friendliness, and availability of relevant information. Travel firms must identify and address these aspects to promote customer happiness and loyalty in a competitive market.

Recommendations

Given the findings above, the most promising recommendation for future research is to conduct a follow-up study emphasizing the success of different marketing techniques and service improvements in Cabanatuan City's travel agencies. This study should evaluate the effects of customized marketing campaigns, such as exclusive package deals and open pricing structures, on acquiring and retaining customers. Input from travelers and travel agencies should be gathered to enhance the day-to-day operations of Cabanatuan City's travel agencies.

The Local Government Unit (LGU) should focus on customized marketing approaches, occasional events, improved customer service delivery, and technology integration for smoother booking processes and personalized interactions. Investigating cutting-edge methods to improve the influx of consumers in the city, such as utilizing technology to create seamless booking experiences and tailored customer interactions, can also increase customer visits and loyalty. This will help inform future business decisions and promote sustainable growth in the industry.

The Department of Tourism should assist the LGU in promoting Cabanatuan City and collaborating with travel agencies to develop and implement cost-efficient consumer strategies. This may involve forming partnerships with local businesses, implementing off-peak pricing models, adapting successful strategies from other cities, and organizing seminars or training sessions on adopting cost-efficient practices.

According to the results of this research, travel agencies in Cabanatuan City should strategically target two critical demographic groups: young people and female solo travelers. Targeting these specific demographic groups with tailored services and promotions is advised, including offering immersive cultural experiences, adventurous activities, gender-neutral accommodations, and addressing safety concerns.

Furthermore, prioritizing transparency, affordability, and top-notch customer service across all demographics is crucial for building trust and loyalty. Travel agencies should offer more promotional discounts, special offers, and exclusive packages to help consumers save money on their vacations. Creating a monthly evaluation or feedback form can also help travel agencies assess what they need to adjust to improve their services. By evaluating the results of these initiatives, travel agencies can gain critical insights into the best ways to cater to local travelers' changing needs and preferences.

It will become easier for consumers to find a travel agency worth spending their money on and entrusting their vacation plans to. Implementing these recommendations can help Cabanatuan City travel agencies position themselves for success and sustainable growth in a competitive market.

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The Influence of YouTube on the Growth and Success of Over-the-Top (OTT) Media: A Study

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Abstract— *This study examines how YouTube shapes OTT media. It looks at visual storytelling, marketing, influencer partnerships, and user-generated content that builds audience loyalty. YouTube's discovery features and creator-audience interaction influence content and marketing. The study also explores how YouTube generates revenue for both OTT platforms and creators. Overall, it explores their interconnectedness in today's media world.*

Keywords— ***YouTube, OTT, Social Media, Viewers, Content, Internet, Monetization, Subscribers, Shorts, Algorithm, Trending, Hashtags, Network, Videos.***

I. INTRODUCTION

As traditional broadcasting crumbles under the rise of online streaming (OTT), social media, particularly YouTube's engaging visual content, is fundamentally changing how we consume and interact with media. This powerful combination of OTT and YouTube creates a synergy that breaks free from old media limitations, ushering in a revolutionary era for both creating and enjoying content.

The advent of OTT platforms has fundamentally transformed the media landscape, introducing innovative content delivery methods and challenging traditional industry standards. These platforms have revolutionized media consumption, offering an abundance of binge-worthy shows and an ad-free viewing experience. Services like Netflix, Amazon Prime Video, Hulu, and Disney+ have eliminated the limitations of scheduled programming, allowing users the freedom to watch content at their convenience and on various devices (Hill, 2020). The popularity of Over-the-Top (OTT) platforms stems from their ability to offer viewers greater freedom by overcoming geographical and temporal limitations. This enables a personalized viewing experience that aligns with the evolving preferences of modern consumers. This transformative potential has propelled OTT platforms to a position of dominance, redefining both the media industry and consumer expectations.

Concurrently, social media platforms have redefined audience engagement with content, shifting from passive consumption to active participation (Kaplan & Haenlein, 2010). Known for its visually captivating format, YouTube transcends textual limitations, enabling users to communicate, connect, and express themselves through Shorts and long videos. This move towards visual

communication aligns seamlessly with the ethos of OTT platforms, where visually-driven narratives dominate.

YouTube's strategic positioning at the intersection of transformative forces enhances and extends the reach and impact of Over-the-Top (OTT) media. The intertwined evolution of YouTube and OTT platforms reflects a profound symbiosis that shapes media consumption patterns and redefines audience engagement. YouTube's visual appeal and interactive ecosystem have fostered a paradigm shift where viewers transition from passive consumers to active participants in the media landscape. This participatory framework aligns with the ethos of OTT platforms, which emphasize audience agency and empowerment in content selection and engagement.

Amid these transformative dynamics lies the central focus of this paper: YouTube's significant role in the rise and success of OTT media. This exploration delves into a complex web of interconnected themes, each crucial in shaping the symbiotic relationship between YouTube and OTT platforms. The following sections embark on an insightful journey, examining the various ways YouTube has influenced the narrative and reception of OTT content.

1. Exploring YouTube's Impact on the Success of OTT Media

The alignment between YouTube and OTT media is no coincidence; it is a strategic convergence that significantly contributes to the success of OTT platforms. The captivating visuals intrinsic to OTT content resonate harmoniously with YouTube’s visual language, creating a seamless blend. This synergy between their graphic dimensions forms the foundation for an enriched viewer experience, underscoring the significance of their mutual interplay.

The distinct on-demand nature of OTT platforms necessitates innovative promotional approaches that deviate from traditional broadcasting models (Brown, 2019). YouTube becomes an essential medium for these kinds of endeavors in this setting. Because of its focus on aesthetics of appearance and dynamic content forms, it offers the best platform for creating advertising campaigns that draw viewers in and increase their curiosity about upcoming OTT content.

The collaborative relationship between YouTube and OTT media extends beyond simple promotional endeavors. This real-time connection serves as a testament to YouTube's role in fostering immediate communication. It empowers content creators to gather audience feedback, refine their offerings, and demonstrably respond to viewer preferences.

Furthermore, YouTube's inherent functionalities, encompassing hashtags, trending topics, and its robust content discovery mechanisms, play a crucial role in amplifying the viral potential of content. This, in turn, serves as a critical factor in enhancing the visibility of OTT offerings. The platform's algorithms function as dynamic curators, meticulously guiding users towards content that aligns with their established preferences. This targeted approach effectively extends the reach of OTT media beyond the limitations of traditional promotion, fostering a more organic and widespread audience engagement.

As the pursuit of monetization becomes increasingly important, YouTube's influencer-driven economy provides a significant advantage for both OTT platforms and content creators in YouTube. The platform's extensive user base has given rise to a new generation of influencers who wield substantial influence over consumer decisions. OTT entities can harness this influencer phenomenon to establish additional revenue streams through sponsored posts, endorsements, and product placements, effectively leveraging the platform's strong user engagement.

Given the complexity of these diverse interactions, it is crucial to thoroughly examine YouTube's role in the rise and success of OTT media. This paper embarks on an analytical journey, carefully examining the intricate interplay between YouTube and OTT media. This paper offers an insightful perspective on the transformation of the contemporary media landscape by highlighting the multifaceted aspects of their collaborative potential.

2. YouTube: A Platform for Visual Storytelling and Promotion

The Over-the-Top (OTT) revolution has redefined entertainment consumption. Live-streaming technology has enabled internet delivery of movies and shows, bypassing traditional cable subscriptions. This internet-driven shift, coupled with the rise of mobile entertainment, has transformed how we access media.

YouTube, with its interactive features, fosters a seamless integration of promotional content within user experiences. This organic approach enhances the narrative journey of OTT content, drawing viewers deeper into the story and fostering anticipation for future episodes or seasons.

For instance, Disney+, Netflix and Amazon Prime utilizes YouTube's vertical short layout to showcase visually appealing content snippets and behind-the-scenes glimpses. This strategic approach effectively piques user interest, further propelling engagement with their OTT offerings.

Netflix's "Stranger Things" campaign exemplifies this concept further. By leveraging YouTube's interactive features, including polls, engaging short videos, and live streams, the campaign fosters a sense of active participation and cultivates a community around the show. This approach strengthens the audience's connection to the content and capitalizes on principles of cognitive psychology. By triggering a sense of belonging and investment in the narrative, the campaign fosters a deeper engagement with the viewers.

The successful integration of YouTube's interactive features, as demonstrated by OTT platforms like Disney+ and Netflix, highlights the platform's efficacy in promoting content and fostering deeper audience engagement. This immersive and meaningful approach signifies a paradigm shift in OTT content promotion, fostering a more organic and interactive relationship between viewers and the media they consume.

2.1 YouTube's Role in Elevating OTT Media Through Visual Storytelling

The digital landscape's constant evolution has pushed storytelling beyond traditional mediums. It now thrives as a dynamic art form, heavily reliant on captivating visual narratives. Social media platforms exemplify this transformation, serving as fertile grounds for crafting stories that resonate deeply with audiences.

Among these platforms, YouTube has already established itself as a titan of visual content. Its capacity to convey messages and evoke emotions is undeniable. This potency, coupled with its colossal user base exceeding billions of active users, solidifies YouTube's status as a cultural phenomenon and a powerful tool for shaping narratives and propelling content into the mainstream.

This emphasis on visual storytelling perfectly complements the landscape of Over-the-Top (OTT) media. OTT platforms, known for their unique approach to content consumption, leverage the immersive power of captivating visuals to engage viewers in intricate narratives. This shared visual language fosters a profound synergy between YouTube and OTT media. It provides a captivating platform for OTT creators and platforms to showcase the essence of their content and draw audiences into these immersive storytelling experiences.

The symbiotic relationship between YouTube and OTT media exemplifies the convergence of these powerful domains. YouTube Shorts captivating visuals seamlessly complement OTT media's focus on immersive storytelling. This organic partnership fosters deeper user engagement, anticipation, and content exploration. It thrives on the shared understanding that modern audiences crave narratives that resonate on a visceral level. By harmonizing visual elements, these platforms create an environment that transcends passive observation, transforming users into active participants in the storytelling process.

Understanding the psychology of visual engagement is necessary to fully appreciate this dynamic interaction. Studies on neuroscientific subjects have shown how well the human brain interprets visual information. Johnson et al. (2017) claim that because the brain absorbs visuals about 60,000 times quicker than text, viewers may quickly comprehend and internalize intricate storylines. Visual storytelling has been the most popular approach for creating material because of this cognitive advantage. This biological inclination forms the basis of YouTube, which uses its visually immersive design to attract viewers and encourage interaction. Through a flawless integration with the visual appetite of the human brain, YouTube creates an atmosphere that is ideal for the promotion of compelling stories that are consistent with the values of Over-the-Top media.

The synergy between YouTube and OTT media goes beyond their shared visual appeal to encompass experiential engagement. OTT platforms redefine how users interact with media by offering on-demand content accessible across various devices. YouTube complements this experiential shift by providing avenues for content previews, teasers, trailers, behind-the-scenes glimpses, and interactive elements that enhance viewer anticipation. This phenomenon is akin to the "previews" seen in traditional movie theaters, which build excitement and community among movie enthusiasts.

Moreover, YouTube's content presentation aligns closely with OTT media principles. For example, the platform's Stories feature mirrors the episodic structure commonly found in OTT series, where content is segmented for easier consumption. YouTube's dynamic content formats, such as live videos and Shorts, capture the concise nature of OTT content—designed to fit seamlessly into viewers' busy lifestyles. This natural alignment fosters an immersive and user-friendly experience that reflects the viewer-centric approach of OTT platforms.

Regarding the uploading and sharing videos the YouTube itself mentioned that “The simple upload, conversion and share tools mean that no special skills are required to put your video online for the world to see”(YouTube, 2011, p1). Based on their similar visual language and dedication to storytelling, YouTube and OTT media have a partnership. This alignment shows a deep awareness of the modern audience's preference for visual interaction and goes beyond simple content promotion. In a time when tales are told on screens of all sizes and face fierce

competition from social media sites like Facebook and Instagram, YouTube proves to be a powerful medium for telling stories that have a lasting impact. OTT media also provides an immersive experience with eye-catching graphics social networking sites are very important in our lives, and the content they provide is significantly superior to traditional media. This meeting point of digital domains embodies the craft of storytelling in the contemporary day, when pictures and videos serve as channels for shared experiences and emotional connection in addition to being useful instruments for communication (Verma and Kalorth, 2017).

2.2 Approaches Used by Content Creators and OTT Platforms for Visual Storytelling and Promotion on YouTube

The connection between YouTube and OTT media surpasses superficial visual appeal; it enters a domain of strategic creativity that content creators and OTT platforms utilize to maximize the platform's capacity for crafting narratives and promoting content. Beyond the engaging Shorts, images, and standard videos lies a deeper level of deliberate strategies, where storytelling is intertwined with the platform's interactive capabilities. This strategic interplay between YouTube's dynamic tools and the goals of OTT content promotion reflects a deep comprehension of contemporary digital dynamics, influencing the direction of audience engagement with content. For creators, YouTube serves as a versatile platform that accommodates a wide range of visual storytelling techniques. The platform offers a variety of features, such as swipeable Shorts carousels for immersive experiences, stories for ephemeral storytelling, and longer formats like live videos and full-length videos, providing a canvas for crafting complex narratives. This diversity of content formats acknowledges the modern audience's fragmented attention span. By presenting stories in concise and easily digestible formats, creators leverage cognitive processes optimized for rapid information absorption. Neurologically, the brain processes visual content more efficiently than text (Johnson et al., 2017). Therefore, YouTube and its short videos serve as a medium for creators to convey and curate memorable moments that resonate in an instant.

Furthermore, YouTube's interactive and easily consumable format harmonizes perfectly with the fundamental principles of OTT content. The brief narratives found in Shorts and images, for example, parallel the episodic structure typical of OTT series. Each segment of a Story functions as a contained chapter, building anticipation and encouraging viewers to follow the storyline. This approach aligns with the psychological theory known as the "Zeigarnik effect," where unfinished narratives create cognitive tension that motivates audiences to return and seek resolution (Zeigarnik, 1927). This psychological principle serves as a strategic advantage for content creators, boosting user engagement and enhancing the memorability of their narratives. On the other hand, OTT platforms have acknowledged YouTube's significant influence and developed sophisticated promotional campaigns that capitalize on the platform's inherent strengths. YouTube's extensive user base and engagement features enable OTT platforms to effectively convey the essence of their content. Teaser videos intrigue audiences, sparking curiosity and creating a sense of anticipation akin to classic cliffhangers.

Behind-the-scenes insights breathe life into the content, encouraging users to engage in the creative journey. Challenges and interactive elements cultivate a participatory culture, enhancing the viewer's connection with the content and nurturing community involvement. Also, "While many social media proved to be ephemeral, YouTube continues to rapidly expand and has become the second most visited website in the world. It has thereby established a unique role as a repository of popular culture, creating a diachronic archive over time as well as synchronically expanding in its scope."(Arthurs et al., 2018, p1).

In content discovery, hashtags and keywords serve as strategic markers directing audiences to valuable OTT content. The effectiveness of these tools lies in their ability to surpass language barriers and organize content into thematic groups. Research conducted by De Cicco et al. (2019) explores the cognitive processes associated with hashtags, highlighting their function as mental shortcuts that streamline content discovery. By incorporating relevant hashtags, OTT platforms enhance the discoverability of their content across user searches and popular topics, positioning their offerings for potential viral reach. Influencer collaborations represent another facet of YouTube's strategic appeal for OTT platforms. As social influence increasingly ties to endorsements from influencers and celebrities, OTT platforms harness this trend to access established fan bases. This broadens content reach and imbues it with the credibility and charisma of influencers, enhancing engagement levels. The science of social influence, as studied by Cialdini (2001), underscores the impact of authoritative figures on decision-making processes. By enlisting influencers as advocates, OTT platforms capitalize on this psychological phenomenon to sway user preferences in favor of their content. The intricate relationship between YouTube and OTT media merits further exploration. The strategic use of YouTube's diverse features is pivotal in creating narratives that resonate, captivate, and leave a lasting impression on

users. YouTube's versatility allows content creators to customize their stories for an audience with fragmented attention spans and a preference for interactive experiences. Meanwhile, OTT platforms orchestrate carefully crafted campaigns that harness YouTube's large user base, engagement tools, and the influence of social media personalities. This coordinated effort of strategies elevates content to new digital heights, influencing engagement metrics and shaping the evolving landscape of content consumption in the digital age.

2.3 Case Studies and Examples of Successful Visual Storytelling and Promotion Campaigns on YouTube

The fusion of YouTube's visually immersive platform with the compelling narratives of OTT media is more than mere happenstance; it is a deliberate meeting designed to captivate and engage modern audiences in innovative ways. This dynamic synergy between the platforms isn't just theoretical; it has been substantiated through a range of ingenious case studies and real-world examples that demonstrate the true impact of their collaboration.

Schwemmer and Ziewiecki (2018), said that since its inception in 2005, YouTube has transformed into a vital marketing platform for social media influencers. Research indicates that influencers, viewed as opinion leaders, leverage electronic word-of-mouth to promote products. However, the extent of this phenomenon remains underexplored. The study "Social Media Sellout: The Increasing Role of Product Promotion on YouTube" aims to fill this gap by analyzing 139,475 videos from German YouTube channels between 2009 and 2017. Utilizing automated content analysis, the study finds a marked increase in product promotion, especially in the beauty and fashion sectors. These findings highlight the significant social and economic impact of influencers, particularly on younger audiences, and call for further investigation into their influence (Schwemmer and Ziewiecki, 2018).

YouTube endorsement marketing, often termed native advertising, seamlessly incorporates advertisements into video content, setting it apart from traditional commercials. This strategy can be classified into three types: direct sponsorship, where content creators collaborate with sponsors to produce videos; affiliate links, which provide creators with commissions from purchases driven by their content; and free product sampling, where creators receive products for free to showcase in their videos. These marketing forms are common across various genres such as beauty, fashion, gaming, culinary, and comedy. The dynamics among key stakeholders—content creators, viewers, YouTube, and companies—highlight the effectiveness of YouTube marketing, but also underscore the urgent need for greater transparency. The paper contends that although YouTube marketing is popular and effective, it necessitates improved disclosure practices to comply with Federal Trade Commission (FTC) guidelines. It identifies issues like inconsistent disclosure methods and the lack of conspicuousness in disclosures buried in description boxes. The paper proposes that enhancing transparency and establishing a uniform standard for disclosure on YouTube would not only preserve marketing effectiveness but also build viewer trust and foster consumer goodwill (Wu, 2016).

Yoganarasimhan (2012), discovered and explained that the impact of local network size and structure on the aggregate diffusion of products seeded by a node has been a subject of interest, particularly within the context of YouTube. Existing literature indicates that an author's local network plays a crucial role in the popularity of videos they seed, distinct from neighborhood effects on individual behavior often discussed in peer effects studies. This research, addressing endogeneity issues through a rich dataset and meticulous estimation methods, demonstrates that the local network's size and structure significantly drive video popularity, controlling for both observed and unobserved video and author characteristics, as well as endogenous network formation. The study provides practical guidelines for identifying optimal seeds for buzz marketing campaigns on social media, offering insights into factors influencing video consumption on YouTube. This extends our understanding of how local network positions contribute causally to the global diffusion of products, thereby supporting managers in maximizing return on investment in social media marketing.

Jay-vee et al. (2024), explored that in the digital era, consumer attention has increasingly focused on YouTube, where brands utilize captivating videos to influence purchasing decisions through strategic advertisements. This study explores the effectiveness of YouTube advertisements on consumer purchasing intentions, specifically analyzing the impact of ads from two prominent food delivery applications, Food Panda and Grab, among respondents in Metro Manila. The research examines four variables: Content and Quality, External Factors, Influence Level, and Frequency of Viewings. Surveys distributed via Google Forms provided data for analysis. The findings reveal that YouTube advertisements significantly affect consumer purchasing decisions, with all four variables playing crucial roles. Notably, the Frequency of Viewings for Grab's YouTube advertisements emerged as the most influential factor, showing a Pearson correlation of 0.887. These insights offer valuable guidance for marketers, advertisers, and decision-makers in optimizing their strategies within the digital marketing landscape.

3. Marketing and Partnerships for YouTube Content Creators

A remarkable mutually beneficial relationship has developed in the dynamic realm of digital media between social media platforms and the persuasive ability of marketing. This complex interaction has completely changed the way that material is promoted and has emerged as a major influence on the tastes and behaviors of consumers. YouTube, the unchallenged social media behemoth, is leading this change and has used it to transform the way that content promotion is done. This section of research delves into the world of YouTube influencer marketing and strategic alliances, revealing the critical function that influencers play as drivers in expanding the audience and significance of Over-the-Top (OTT) media content.

Influencer marketing's rise in the vast digital space is comparable to the combination of old-fashioned word-of-mouth recommendation and the infinite reach of the internet. But even with this combination, YouTube's unique effect is evident, turning it into the birthplace of contemporary content marketing. Influencers—people with significant influence over large numbers of subscribers—are at the center of this shift and are a powerful medium for content messages to spread.

Influencer marketing works best when psychology and digital media dynamics are combined, and YouTube is the ideal platform for this kind of content. Influencers profit from the psychological concept of "social proof," which states that people copy the decisions and behaviors of others, especially those they regard as knowledgeable and reliable (Cialdini, 2001). In this regard, "There is an explosion of youth subscriptions to original content-media-sharing Web sites such as YouTube. These Web sites combine media production and distribution with social networking features, making them an ideal place to create, connect, collaborate, and circulate" (Chau, 2010, p1). Therefore, to capitalize on this propensity, content providers use their authority and rapport with their followers. When YouTube content creators support Over-the-Top (OTT) material, they are presenting an endorsement that deeply connects with their viewership.

This is a well-planned partnership rather than an accidental one between YouTubers and OTT . In the era of digital role models, YouTubers help connect consumers and content creators. This relationship is a vivid example of how Bandura's Social Cognitive Theory explains observational learning (Bandura, 1986). Influencers function as concrete role models in this environment, and their thoughts are highly influential. This relationship is the basis of influencer marketing, in which the approval of a virtual peer is interpreted as coming from a reliable influencer. YouTube serves as a powerful medium for promoting the ideas of observational learning because of the way that visual content weaves a gripping story for its audience.

The effectiveness of YouTuber/content creator marketing extends beyond its initial engagement stats. Its real power is in turning interaction into loyal subscribers and steady watchers. Lin and Lu (2011) research highlights the significance of social influence in influencing consumers' adoption of new media. Their results highlight the fact that people are more willing to use new services and technology if they believe their social circles to be renowned for them. Influencers use their endorsements as a kind of virtual seal of approval in influencer marketing, encouraging their followers to interact with and actively subscribe to the material. This approach is further enhanced by YouTube's smooth integration of links and content within posts and Stories. This integration is consistent with the compatibility idea of the technology acceptance paradigm, which holds that consumers' familiarity and ease of use influence their adoption of new technology (Davis, 1989). The endorsement of YouTubers who are also content providers, when offered on a reputable and well-known platform, helps close the gap between interaction and takeaways, facilitating the shift from interest to regular viewing. In conclusion, YouTube's contribution to the acceleration of influencer marketing in the context of OTT media promotion is evidence of the platform's significant impact on contemporary content consumption. Influencer marketing is more than just an advertising tactic; it's a psychological process driven by the ideas of observational learning and conformity. In this situation, YouTube has evolved smoothly into a venue where influencers connect producers and customers, converting interaction into steadfast allegiance. This collaboration is a prime example of the complex tango between media dynamics, technology, and psychology that characterizes the digital age.

3.1 YouTube's Power Players: How Content Creators Drive OTT Media Engagement

The dynamic union of conventional word-of-mouth advertising with the reach and influence of the internet age is known as YouTuber or content creator marketing. YouTube, with its wide user base and varied roster of content creators, has emerged as the focal point of this marketing revolution. YouTubers possessing a significant number of subscribers and viewers, along with specialized knowledge, have the ability to influence customer preferences and purchase decisions. YouTubers use their authority positions in OTT media to promote content and craft compelling storylines. The idea of social proof is

connected to the science underlying youtuber marketing's efficacy. Social psychologists have long noted how people have a tendency to mimic the behaviors and viewpoints of others, particularly those they consider to be reliable and informed (Cialdini, 2001). Content providers take advantage of this psychological inclination because of their well-established identities and rapport with their users. When content producers support Over-the-Top (OTT) material, they are essentially giving their audience a thumbs-up that really connects with them.

3.2 Partnerships Between OTT Platforms and Content Creators on YouTube

The union of OTT media and YouTube content creators is not accidental; rather, it is a calculated partnership that promotes a win-win outcome. High-quality content is made available to content creators (YouTubers) so they can customize their feeds and meet the tastes of their audience. Concurrently, the established fan base of YouTubers is tapped into by OTT platforms and content developers, who gain from their credibility and capacity to connect their content with the intended audience. These partnerships are an example of how people learn through both direct experience and observation of others, as explained by Bandura's Social Cognitive Theory (Bandura, 1986). Within this framework, YouTubers take on the role of role models, and their endorsements increase the content's perceived worth. The effectiveness of influencer marketing on YouTube, where identification with these digital role models frequently drives content consumption, is boosted by this convergence of observational learning and social endorsement.

3.3 The Influence of Content Creator Marketing on Audience Engagement and Subscriptions to OTT Platforms

The efficiency of youtuber marketing is only largely determined by first engagement figures. Its ability to transform simple interaction into ongoing subscriptions and watching is where its real power resides. This phenomenon is highlighted by Lin and Lu (2011) on the function of social influence in the adoption of new media. They discovered that when people think new services and technology are popular in their social groups, they are more likely to embrace them. By acting as a virtual peer recommendation, an influencer's endorsement in influencer marketing encourages their followers to check out and subscribe to the promoted Over-the-Top (OTT) content. This approach is facilitated by YouTube's user-friendly interface, which enables influencers to easily incorporate links to OTT platforms and content into their feeds and Shorts. The technology acceptance model's compatibility concept is in line with this intentional blending of social influence and technology integration (Davis, 1989). When the endorsement is given through a channel that the audience is already familiar with and trusts, the shift from engagement to action happens naturally. The realm of YouTuber marketing extends beyond traditional advertising. YouTube's immersive interface combined with the YouTubers' air of authenticity creates an atmosphere where endorsements mean more than just passing glances. Influencer-driven OTT content promotion is very effective, as demonstrated by the psychology of validation and observational learning. Furthermore, OTT content makers and YouTubers collaborate to bridge the gap between audience and content through a strategic alignment based on Social Cognitive Theory. The process by which YouTuber endorsements convert into long-term viewer engagement and subscriptions is made clear by the psychological concepts of conformity and the technological acceptance model. This process ultimately changes the dynamics of content promotion in the OTT media space.

4. Monetization Opportunities on YouTube for OTT Platforms and Content Creators

The relationship between Over-the-Top (OTT) media and YouTube's monetization tools has given advertisers and content developers additional opportunities. Through the utilization of YouTuber endorsements and strategically designed user involvement, marketers can effectively develop a compelling and authentic relationship with their target audience. Additionally, incorporating psychological concepts like congruity can maximize the effectiveness of marketing campaigns.

4.1 Harnessing YouTube's User Base for Supplementary Revenue Streams

The intersection of creativity and commerce in the ever-changing world of digital media has become a complex environment that requires creative ways to make ends meet. Within YouTube's wide ecosystem, this terrain has revealed a wealth of prospects for Over-the-Top (OTT) services and content creators. A strong basis for enhancing revenue streams is created by the symbiotic relationship between OTT media's fascinating stories and YouTube's enormous user base. YouTube has become the hub for users to distribute their attention, taking cues from the Attention Economics Theory (Davenport and Beck, 2001) that states that in the information age, attention is limited. This distribution generates interaction and, as a result, revenue opportunities. By utilizing this resource, content producers and OTT platforms build captivating narratives that draw viewers in and set the stage for revenue diversification.

4.2 Endorsements, Promotional Videos, and Product Placements on YouTube

The rise of the digital youtuber economics has made it possible to generate income through product placements, sponsored videos, and youtuber endorsements. This phenomena, which is intricately entwined with YouTube culture, has turned into a key for OTT companies looking to profitably monetize their content. YouTube Influencers serve as go-betweens, bringing together content producers and their intended audience. By matching their persona to a particular piece of OTT material, YouTubers can set off a chain reaction of engagement that generates a wave of curiosity and intrigue. This mutually beneficial relationship is comparable to the persuasion psychology field's Elaboration Likelihood Model (ELM) (Petty & Cacioppo, 1986). Influencers increase user engagement by acting as ancillary cues that are only loosely related to OTT content. Because of the legitimacy of these recommendations, viewers' opinions are formed in the background as a result of peripheral processing brought on by the youtuber's advice. This peripheral processing increases the chance that users may explore the recommended Over-the-Top (OTT) content even if it is less cognitively taxing. As a result, creators and OTT platforms profit from this interaction and successfully monetize their products.

4.3 Successful Examples of Monetization Strategies on YouTube Through Promotional Campaigns

Empirical examples of profitable ventures highlight the effectiveness of this mutually beneficial strategy. The effectiveness of influencer endorsements is demonstrated by Netflix's collaboration with YouTube personalities *Ashishchanchalinvines* and *Slayypointofficial* to promote their original series "The Squid Game." Enormous fan base and the target demographic's alignment greatly increased the Web series' reach. This situation is consistent with the Congruity Theory (Osgood & Tannenbaum, 1955), which holds that persuasiveness is increased when the endorser's persona and the substance they support are compatible. The web series' target audience and Pons's youthful, relatable image aligned to produce a harmonious resonance that increased engagement and revenue. Furthermore, the deliberate use of YouTube by Amazon Prime for product placements highlights the convergence of business and art. Amazon Prime employs the skill of nuanced persuasion by integrating its products into relatable, real-world situations. For example, using the roasting video offered by Amazon Prime India, prominent YouTuber *Carryminati* promoted the Indian film *Runway34*. According to Zajonc's (1968) explanation of the psychological phenomena known as the Mere Exposure Effect, preference is bred by familiarity. Product integration by Amazon Prime into YouTube clips creates a sense of familiarity that leads to consumer preference through repeated exposure. For OTT platforms, this clever integration of items into relatable stories offers a novel way to monetize their content. YouTube may be made profitable via OTT platforms, content producers, and channel partnerships as well as through product integration and audience engagement. The foundation for revenue diversification is YouTube's marketing videos and Shorts, which the Attention Economics Theory explains as a platform where attention is distributed. Influencer endorsements strategically direct user engagement toward content that can be monetized, taking cues from the Elaboration Likelihood Model. Empirical instances that incorporate psychological theories such as Congruity and Mere Exposure accentuate the efficacy of influencer collaborations and product placements. The symbiotic relationship between OTT media and YouTube's monetization outlets pushes the frontiers of financial and creative innovation as the digital world changes.

5. User-Generated Content and Community Engagement in YouTube

The digital media environment has been profoundly impacted by user-generated content (UGC) and fan communities(FC), particularly on sites like YouTube. Nearly 80% of consumers claim that user-generated content (UGC) influences their purchasing decisions, making it a potent tool for marketers. The popularity of Over-the-Top (OTT) media is greatly impacted by the closely-knit, participatory cultures that fan communities—which are cultivated by YouTube and other platforms like Instagram and Facebook—have developed into. These communities increase engagement and a sense of belonging. The convergence of user-generated content (UGC) and fan groups has democratized the process of creating material, allowing audiences to participate actively as co-creators rather than just as viewers. In order to increase consumer loyalty and draw in new customers, brands are now focused on active fans and producing entertaining, engaging content, which has also altered how brands interact with their audiences. YouTube has a big influence on user-generated content (79% of respondents feel it has a major influence on their purchasing decisions). YouTube is a vital platform for marketers to get creative and use user-generated content (UGC) to engage with their customers because of its visual nature. With 2.49 billion monthly active users as of March 2024, YouTube is the second most popular social media site, right behind Facebook.

5.1 YouTube's Contribution to Cultivating User-Generated Content for OTT Media

YouTube's contribution to the emergence of user-generated content has highlighted the platform's revolutionary effect on media consumption. User-generated content (UGC) is a living example of how audiences can be empowered to become active creators rather than just passive consumers. Because of its visually captivating material and intuitive layout, YouTube has provided viewers with the ideal platform to express their originality and enthusiasm for their preferred Over-the-Top stuff. The relationship between content makers and viewers has been strengthened through the co-creative process. However, it has also given content producers access to a wealth of genuine, interesting, and varied content.

The Cognitive Theory of Participatory Culture, as proposed by Jenkins (2006), clarifies the transformative potential of user-generated content (UGC) and fan networks. It highlights the fact that media consumers are now active players who produce and distribute material rather than only passive recipients. YouTube's intuitive user interface has made this idea a reality. The platform's emphasis on visuals makes it easy to move from passive viewing to collaborative creation. As fans add their own interpretations and creativity to the story, this interaction increases the visibility of OTT content and amplifies its resonance.

5.2 Fan Communities and Their Contributions to the Success of OTT Content: Examples and Insights

YouTube fan networks have grown beyond simple fandom and have become true centers of creativity, friendship, and information sharing. One prime example is the "Game of Thrones" fanbase, where YouTube has functioned as a vast repository of fan art, episode recaps, and group conversations. These fan-driven projects offer an environment in which an OTT series' ardor transforms into a rich tapestry of content, expanding the series' audience much beyond its first episodes. However, "By encouraging youth to become media creators and social networkers, new media platforms such as YouTube offer a participatory culture in which youth can develop, interact, and learn" (Chau, 2010, p1). Fan interaction, in an intriguing way, improves emotional engagement and connection to the content.

YouTube enhances this immersive experience with its visual and interactive elements, enabling fans to express their emotional engagement through visuals and have lively discussions with other aficionados.

5.3 Strategies Used by OTT Platforms and Content Creators to Foster and Engage Fan Communities on YouTube

Instead of just observing the growth of fan communities on YouTube, OTT platforms and content producers have taken an active role in fostering and utilizing these communities. They have implemented creative tactics that include content sharing, direct interaction, and interactive campaigns. One innovative strategy is the use of OTT "takeovers," in which actors or artists take over an OTT platform's account for a short period of time in order to use the promo codes to promote their films or television shows. This tactic combines fan interactions with behind-the-scenes details to create a tangible sense of inclusion. Building fan communities is become a reciprocal art form. Fans' creative efforts are being recognized by OTT platforms and content creators, who frequently feature fan artwork, analyses, and hypotheses on their official accounts. By fostering a sense of validation and community, this appreciation turns fans become brand ambassadors who naturally spread content. These tactics have strong psychological foundations. According to Deci and Ryan (1985), the Self-Determination Theory (SDT) emphasizes the importance of relatedness, autonomy, and competence in human motivation. These basic human needs are met by content providers and fan communities on YouTube and OTT platforms. A comprehensive engagement loop is created by the freedom to express creativity, the ability to contribute significantly, and the relatedness within the community. Without a question, YouTube has become a thriving environment for combining fan networks with user-generated content, adding a fresh perspective to the digital media landscape.

YouTube's interactive culture effectively turns viewers into co-creators, producing a wide range of genuine content that is rich and varied. Fan communities are vibrant manifestations of this participatory culture, thriving as epicenters of innovation and enthusiasm. Sensitive to this paradigm change, OTT platforms and content producers have created creative approaches that yield reciprocal engagement, thus fostering a win-win ecosystem. The significant interaction that exists on YouTube between content producers, platforms, and fans is evidence of the platform's contribution to the development of Over-the-Top media by democratizing engagement and creating immersive connections.

6. Discoverability on YouTube and Trend Spotting

It is simple to become confused and overwhelmed by the vast amount of content that is available on Over-the-Top (OTT) platforms. Thankfully, algorithms for content curation have been created to address this problem. These

algorithms suggest information that is in line with users' tastes by analyzing their behaviors, hobbies, and preferences. As a result, viewers are encouraged to consume more content and the user experience is improved. Because of this, these algorithms are now essential for increasing the visibility of information and following industry trends. Use content curation algorithms to find fresh content that matches the interests of your audience and transform the way people watch.

6.1 The Influence of YouTube's Discovery Features on OTT Media

Discoverability is a major difficulty in today's digital landscape due to the abundance of content. With so many options available in the Over-the-Top (OTT) media space, YouTube's function as a discoverability accelerator has become increasingly important. YouTube's inherent layout and search engine, which are distinguished by their eye-catching aesthetic and engaging elements, enhance their ability to function as a platform for discovery. The immersive quality of Over-the-Top media is in perfect harmony with the core of YouTube's straightforward architecture, which promotes the quick consumption of visual information.

The discovery process can be compared to animals foraging for food in an environment rich in information, a concept taken from Pirolli and Card (1999) Information Foraging Theory. As the digital terrain, YouTube helps viewers with their "foraging" by offering visually appealing, bite-sized content that acts as a navigational aid. This fits in perfectly with Over-the-Top (OTT) media, where visually engaging material is at the forefront of user immersion. The explore features of YouTube appeal to people's innate desire for stimuli that are simple to process, which increases the likelihood of discovering pertinent Over-the-Top content.

6.2 Leveraging Hashtags and Trends to Amplify OTT Content on YouTube

The ubiquitous nature of hashtags in the YouTube ecosystem has caused them to evolve from a simple means of labeling content to a dynamic instrument for content classification, community building, and—most importantly—trend amplification. Because hashtags can bring disparate information under one roof, they play a crucial role in improving OTT media discoverability. The clever use of particular hashtags guarantees that OTT-related material finds its way onto users' exploration paths, breaking through viewer networks and into more expansive, trend-driven discoveries. YouTube has become a refuge for trend-spotting, a sophisticated art form perfected by contemporary marketers and content creators.

YouTube is a watchtower for seeing cultural trends in an era where they come and go like digital tides. The idea of trend spotting is similar to Rogers (1962) Diffusion of Innovations Theory, which describes how new ideas spread throughout a community. Algorithm-driven suggestions, trending hashtags, and YouTube's Community page all serve as digital representations of the diffusion process. OTT content curators may ride the trends and make sure their content is still current and resonates by proactively utilizing these technologies.

6.3 Case Studies on Decoding Discoverability and Trend-Spotting on YouTube

Andry et al. (2021), In Their paper investigated user behavior and video recommendation algorithms on YouTube, a prominent video-sharing platform. YouTube caters to a diverse audience seeking various content types, including educational materials, entertainment (gaming, music, short films), and informative videos. Entertainment content is particularly popular among users under 50, while students utilize YouTube for educational purposes, supplementing their studies. Additionally, adolescents and adults leverage YouTube as a global information source due to its unrestricted access across borders. The authors explore data mining techniques like classification, association rule learning, and clustering to analyze the YouTube algorithm responsible for identifying trending videos. By employing existing data mining software, the study reveals that YouTube prioritizes metrics like views, likes, dislikes, and comments when curating trending content. These findings offer valuable insights into user preferences and the factors influencing video recommendations on YouTube.

Irshad et al. (2023), in their article entitled "Trending or not? Predictive analysis for YouTube videos" explained that the rise of the internet has fundamentally reshaped communication and social interaction. Social media platforms, initially intended for casual connections and sharing, have transformed into multifaceted hubs, influencing consumer behavior and fostering global connections. YouTube, a prominent example, has undergone significant changes, particularly regarding advertising and video recommendations. Driven by a revenue-sharing model, YouTube prioritizes increasing video views and has implemented video categorization, including a dedicated "trending videos" section. This research leverages existing machine learning techniques, such as support vector machines, logistic regression, and decision trees, to predict whether a video will be categorized as trending. Employing supervised learning methods, the authors compare the performance of these algorithms in identifying trending content on YouTube. This approach addresses the need for effective prediction

models to navigate the dynamic landscape of online video platforms.

Caldera et al. (2021), described that the social media platforms have become ubiquitous for sharing content and fostering social connections. This research area focuses on trending video content sharing specifically on YouTube, where content with high social impact can rapidly gain popularity. Predicting whether a video will become trending is valuable for both creators and viewers. Existing literature primarily explores methods to directly capitalize on trending content. This paper proposes a novel approach for predicting trending videos using a graph network embedded within a classification algorithm. The proposed model leverages the connections between content creators (root nodes) and their published content (seed nodes) to capture user engagement. By focusing on a binary classification task (trending vs. non-trending), the authors employ dimensionality reduction techniques to extract key features from both nodes. Their findings demonstrate that logistic regression outperforms other methods for this task, achieving an accuracy of 82.33% in their novel prediction system. Furthermore, the study sheds light on characteristics of trending YouTube channels in Sri Lanka. They identify that these channels typically possess over one million viewers, more than 100,000 subscribers, and are predominantly created by Sri Lankan content producers. These insights provide valuable context for understanding the specific social media landscape within the region.

II. CONCLUSION

The journey through this investigation has revealed the deep relationship that exists between YouTube and the growth of Over-the-Top (OTT) media. The combination of these two titans highlights the power of cooperation in transforming interaction and content consumption patterns as the digital landscape changes. Backed by billions of users, YouTube's visually rich environment has become a real force behind the expansion of Over-the-Top (OTT) media.

The visually focused nature of YouTube and the compelling stories found in Over-the-Top (OTT) content combine to create a powerful synergy that enhances both platforms. YouTube provides a dynamic venue for the art of visual storytelling, as content creators and Over-the-Top platforms skillfully craft narratives that captivate, anticipate, and fully immerse viewers.

Furthermore, content creator marketing has developed into a powerful tool that leverages YouTube's ecosystem to increase the audience reach of Over-the-Top (OTT) content. In addition, fan networks and user-generated content have given rise to immersive experiences that increase audience loyalty and content resonance. Viral trends are shaped by YouTube's discoverability systems, which increase the visibility of OTT videos. Last but not least, there are numerous ways for OTT platforms and content producers to monetize their work, with product placements and influencer endorsements becoming popular tactics.

The findings of this investigation portend a new era of creativity and mutually beneficial development for YouTube and OTT media. OTT services and content producers have the opportunity to refine their visual storytelling strategies by utilizing YouTube's dynamic formats and interactive elements. With the sophistication of influencer marketing methods increasing, the relationship between influencers and OTT companies is ready for improvement. Furthermore, the rise of user-generated content as a crucial driver of audience engagement shows the potential for a paradigm change in content co-creation.

It is certain that YouTube's position as a trendsetter and content amplifier will evolve, possibly impacting the dynamics of OTT platforms' content creation. As monetization, the cornerstone of sustainable content, surges in strategies, a fine balance between commerce and content quality will be required.

A comprehensive interaction strategy for OTT platforms and content developers is made possible by this research. Influencer partnerships and visual storytelling ought to be at the forefront, carefully planned to appeal to a variety of target demographics. Participating in fan groups can increase a feeling of ownership and strengthen a person's devotion and loyalty. Making the most of YouTube's discoverability capabilities requires using hashtags, trends, and algorithmic mechanics strategically. Furthermore, to ensure authenticity and consumer trust, monetization tactics need to be properly adjusted to match the tone of the content. Engaging with fan groups, actively participating in content campaigns generated by Over-the-Top (OTT) media, and contributing to trend amplification are all benefits that YouTube users can reap. They have the power to influence the direction of content production by customizing their digital experience and influencing others.

At the end, the dynamic relationship that exists between YouTube and Over-the-Top (OTT) media tells a tale of reciprocal advancement, engagement, and growth. The investigation's findings and recommendations highlight these platforms' capacity to revolutionize the ever-evolving field of digital media, both separately and collectively. As our study draws to a close, it ushers in another phase in the

developing story of YouTube's and OTT media's mutually reinforcing journey.

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