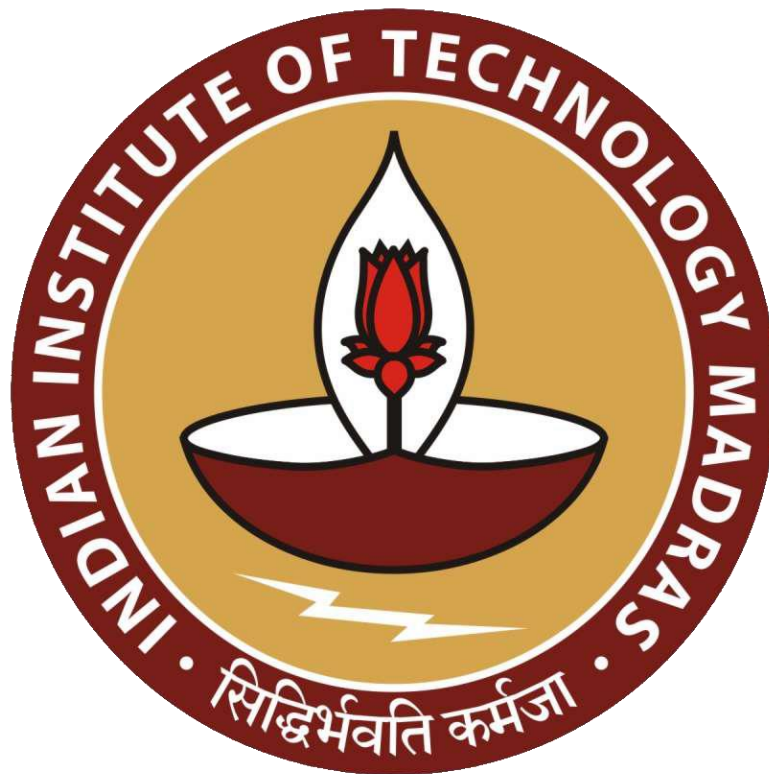


# **CAPSTONE PROJECT FINAL SUBMISSION**

**Submitted by**

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## Executive Summary

Hashtag Digital marketing and Website Company is a digital marketing firm specializing in comprehensive online marketing solution.

Their team of specialist creates customized online marketing strategies, including social media management, website design, and software development to boost brand visibility and growth for business. Their main clients are B2B Companies like Real state companies, jewellery companies, hotel industries etc.

The major business issues that the company is facing recently are related to payment i.e. timely not fulfilment of payment. There is another issue that they are facing is the communication gap between them and their clients due to a smaller number of employees they can't able to reach each of their client's timely which results in further issues and also, they have no sub branch in metropolitan cities.

The issues will be addressed by analysing the different client's data provided by the company from which late payment are accepted, listed, list of client's data who are not satisfied due to employee's issue and subbranches issues. This analytical approach to obtain a fruitful outcome.

The expected outcome helps the company reduce the money blockage in terms of inventory which helps increase the profitability of the company.

The first two stages of the project proposal have been successfully completed, with the goal of optimizing profits for a selected business. Data was then collected and pre-processed manually in an Excel workbook. For the mid-term submission, data analysis was performed using various Microsoft Excel tools, including Pivot Tables, Charts, and formulas such as SUM, MAX, and MIN.

In the final report, the last step—data visualization and result interpretation—was carried out. The charts utilized for data visualization include Column Charts, Line Charts, Bar Charts. Upon reviewing the charts and tables, it became evident that the sales of the company are largely driven by the academic calendar, with the examination period showing the lowest revenue but the highest sales. Additional insights were also gained, such as identifying the top-4 products in terms of both sales and revenue.

Nevertheless, it is crucial to consistently monitor sales data and make adjustments to strategies in order to enhance revenue generation.

With its strong foundation in Durgapur and commitment to innovation and excellence Hashtag is well positioned to achieve lasting success in the field of Digital marketing.

## Detailed Explanation of Analysis Process

The analysis of the data that has been collected is done through time-series analysis technique because the invoice data has been collected over the span of 12 months from January to December for the year 2024.

There are four main types of analysing data and the following written approach is used:

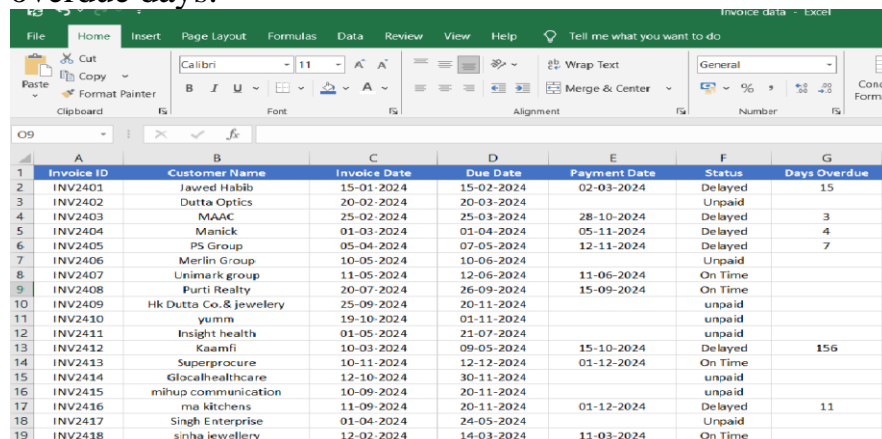
- Descriptive analysis
- Diagnostic analysis
- Predictive analysis
- Prescriptive analysis

Descriptive analysis identifies what has already happened. Basic descriptive analysis of the data has already been presented.

To comprehensively treat Hashtag's issues, **a systematic and in-depth data analysis methodology** was utilized. This included:

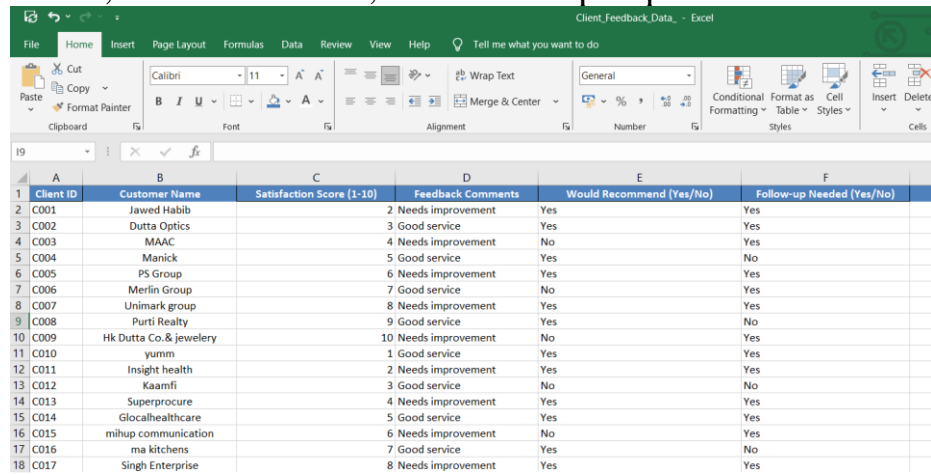
1. **Data Collection and Spreadsheet Utilization:** -Data were collected from the internal data of Hashtag and put in spreadsheets to enable organized structural Analysis. Two main data sets were produced:

- **Invoice Data Spreadsheet:** Maintains records of all the transactions, i.e., the invoice dates, due dates, payment status, and overdue days.



	A	B	C	D	E	F	G
1	Invoice ID	Customer Name	Invoice Date	Due Date	Payment Date	Status	Days Overdue
2	INV2401	Javed Habib	15-01-2024	15-02-2024	02-03-2024	Delayed	15
3	INV2402	Dutta Optics	20-02-2024	20-03-2024		Unpaid	
4	INV2403	MAAC	25-02-2024	25-03-2024	28-10-2024	Delayed	3
5	INV2404	Manick	01-03-2024	01-04-2024	05-11-2024	Delayed	4
6	INV2405	PS Group	05-04-2024	07-05-2024	12-11-2024	Delayed	7
7	INV2406	Merlin Group	10-05-2024	10-06-2024		Unpaid	
8	INV2407	Unimark group	11-05-2024	12-06-2024	11-06-2024	On Time	
9	INV2408	Purti Realty	20-07-2024	26-09-2024	15-09-2024	On Time	
10	INV2409	Hk Dutta Co.& jewelery	25-09-2024	20-11-2024		unpaid	
11	INV2410	yumm	19-10-2024	01-11-2024		unpaid	
12	INV2411	Insight health	01-05-2024	21-07-2024		unpaid	
13	INV2412	Kaamfi	10-03-2024	09-05-2024	15-10-2024	Delayed	156
14	INV2413	Superprocure	10-11-2024	12-12-2024	01-12-2024	On Time	
15	INV2414	Glocalhealthcare	12-10-2024	30-11-2024		unpaid	
16	INV2415	mihup communication	10-09-2024	20-11-2024		unpaid	
17	INV2416	ma kitchens	11-09-2024	20-11-2024	01-12-2024	Delayed	11
18	INV2417	Singh Enterprise	01-04-2024	24-05-2024		Unpaid	
19	INV2418	sinha jewellery	12-02-2024	14-03-2024	11-03-2024	On Time	

- **Client Feedback Spreadsheet:** Contains customer satisfaction scores, textual feedback, and follow-up requirements.



Client ID	Customer Name	Satisfaction Score (1-10)	Feedback Comments	Would Recommend (Yes/No)	Follow-up Needed (Yes/No)
C001	Jawed Habib	2	Needs improvement	Yes	Yes
C002	Dutta Optics	3	Good service	Yes	Yes
C003	MAAC	4	Needs improvement	No	Yes
C004	Manick	5	Good service	Yes	No
C005	PS Group	6	Needs improvement	Yes	Yes
C006	Merlin Group	7	Good service	No	Yes
C007	Unimark group	8	Needs improvement	Yes	Yes
C008	Purti Realty	9	Good service	Yes	No
C009	Hk Dutta Co.& jewelry	10	Needs improvement	No	Yes
C010	yumm	1	Good service	Yes	Yes
C011	Insight health	2	Needs improvement	Yes	Yes
C012	Kaamfi	3	Good service	No	No
C013	Superprocure	4	Needs improvement	Yes	Yes
C014	Glocalhealthcare	5	Good service	Yes	Yes
C015	mihup communication	6	Needs improvement	No	Yes
C016	ma kitchens	7	Good service	Yes	No
C017	Singh Enterprise	8	Needs improvement	Yes	Yes

## 2. Data Cleaning and Preparation: -

Prior to any analysis, the raw data was first cleaned and pre-processed:

- **Missing Values:** Missing dates of payment were addressed by declaring them as "Unpaid" and overdue days were calculated accordingly in order.
- **Date Formatting:** All the date values were formatted as YYYY-MM-DD.
- **Categorization:** Clients were grouped according to payment behaviour (e.g., always on time, frequently late, chronic defaulters).
- **Duplicate Elimination:** Prevented duplication of invoice and feedback entries.
- **Normalization:** Numerical values normalized to facilitate analysis consistency.
- **Outlier Detection:** Used statistical techniques like IQR to identify outlier values that might bias analysis outcomes.

### **3. Python Application in Analysis:-**

Python was heavily utilized for data cleaning, statistical analysis, and visualization. The most important libraries and techniques used were:

- **Pandas:** Utilized for data cleaning and manipulation. The `read_csv()` and `merge()` functions assisted in loading and merging various datasets.
- **NumPy:** Used for numerical computations, such as calculation of means, medians, and standard deviations.
- **Matplotlib & Seaborn:** Utilized for creating visualizations, such as line charts, bar plots, and heatmaps to represent trends in late payments and client feedback scores.
- **Sklearn (Scikit-Learn):** Utilized for predictive modelling, such as logistic regression to predict late payments and pick out high-risk clients.
- **Stats models:** Utilized for sophisticated statistical analysis, such as ANOVA tests and correlation analysis.
- **Text Blob & NLTK:** Utilized for sentiment analysis on client feedback data to glean information on customer satisfaction levels.

#### **Visualization Methods:**

- Line graphs for payment patterns over time.
- Boxplots for delayed payments.

### **4. Spreadsheet Computations and Analysis: -**

Cleaned data was analyzed with Excel functions and Python analytics on Google Collab. Key statistical computations performed included:

**Count:** The number of invoices outstanding that were posted was tallied to estimate the degree of payment delay.

**Mean:** The average days an invoice was in arrears were calculated to determine the overall pattern of payment delay.

**Standard Deviation:** This quantified the variability in days overdue from the mean, whether delays were stable or erratically changing.

**Minimum & Maximum:** Minimum and maximum overdue intervals were quantified in an attempt to ascertain worst- and best-case payment conditions.

**Quartiles (Q1, Median, Q3):** These percentile measures aided in the quantification of the spread of overdue days for every bill.

**Skewness:** Assessed the distribution of the number of days overdue to see whether delays were skewed towards shorter or longer durations.

**Kurtosis:** Verified for the presence of extreme delays by determining if the distribution had extreme values than a normal distribution.

#### A. Descriptive Analysis :-

This gave a snapshot of payment trends and customer feedback.

- **Average Payment Delay:**

$$\text{Average Delay} = \frac{\sum \text{Days Overdue}}{\text{Total Transactions}}$$

- **Median Satisfaction Score:** Used to understand consumer sentiment.
- **Pivot Tables & Charts:** Constructed in Excel to present historical overdue invoices and customer feedback distribution.
- **Histograms & Boxplots:** Used to depict trends in late payment patterns and satisfaction ratings.
- **Variance & Standard Deviation:** Computed to realize the data dispersion.

## B. Diagnostic Analysis:-

For purposes of identifying payment delay causes and customer dissatisfaction:

- **Correlation Analysis:** Applied Excel's CORREL function to test for associations between delinquent payments and client types.
- **Time-Series Analysis:** Graphed issuance of invoices versus payments to identify trends.
- **Customer Segmentation:** Segmented the customers into groups according to their payment history to identify which groups have the highest probability of late payments.
- **Root Cause Analysis:** Identified root causes of customer dissatisfaction through qualitative analysis of customer complaints.
- **ANOVA Testing:** To determine if there are any significant payment differences between different client segments.

## C. Predictive Analysis: -

Predicting The future behaviour: -

- **Logistic Regression for Delayed Payments:** Past data employed to forecast the probability of delayed payments.
- **Customer Churn Prediction:** Reviewed past follow-ups and satisfaction scores from the client feedback data to determine retention risks.
- **Time-Series Forecasting:** Used moving averages and exponential smoothing to predict future payment trends.
- **Machine Learning Models:** Trained models to classify customers as high-risk or low-risk based on historical behaviour.



- **Decision Tree Analysis:** Identified the most significant factors causing late payments and dissatisfaction.

#### D. Prescriptive Analysis; -

Providing actionable recommendations:

- **Early Payment Discounts:** Behavioural effect of offering incentives.
- **Automated Reminders:** Effectiveness established for systematic follow-ups.
- **Sentiment Analysis:** Determined trends from customers' reviews.
- **Dynamic Credit Policies:** Changing payment terms in accordance with customer risk scores.
- **Personalized Engagement Plans:** Suggested different follow-up periods based on customer segments.
- **AI-Powered Chatbots:** Suggested to handle repetitive customer queries and improve response time.

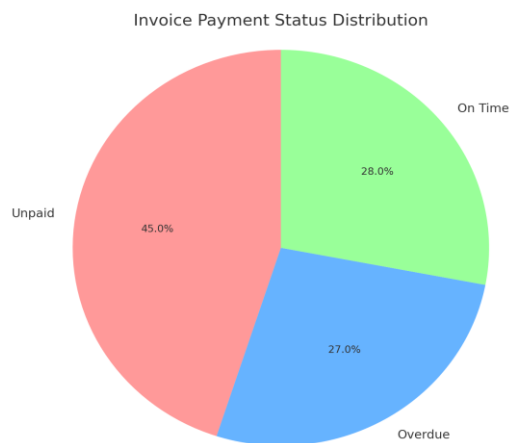
## Results and Findings

### 1. Invoice Dataset Analysis: -

#### ❖ **Payment Status Composition (Pie Chart):**

here the pie chart actively illustrated that-

- 45% of bills were unpaid, which can point to potential cash flow problems.
- 27% were overdue, reflecting delayed payments as a primary concern.



Legend:

● Unpaid: 45%

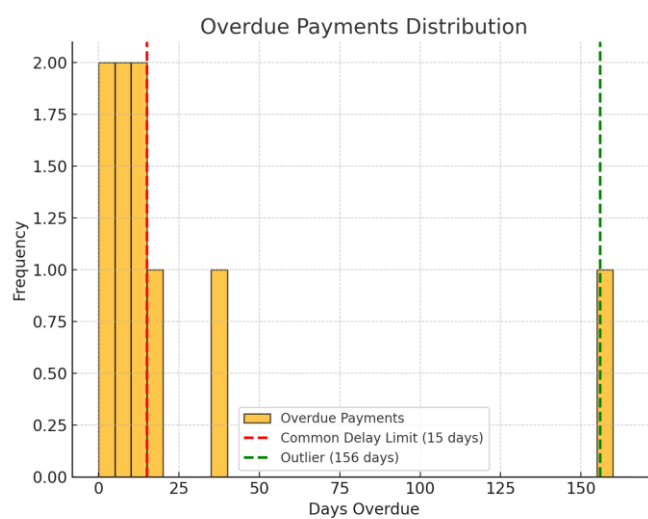
● Overdue: 27%

● On Time: 28%

### ❖ Overdue Payments Distribution:

Here histogram represents that :-

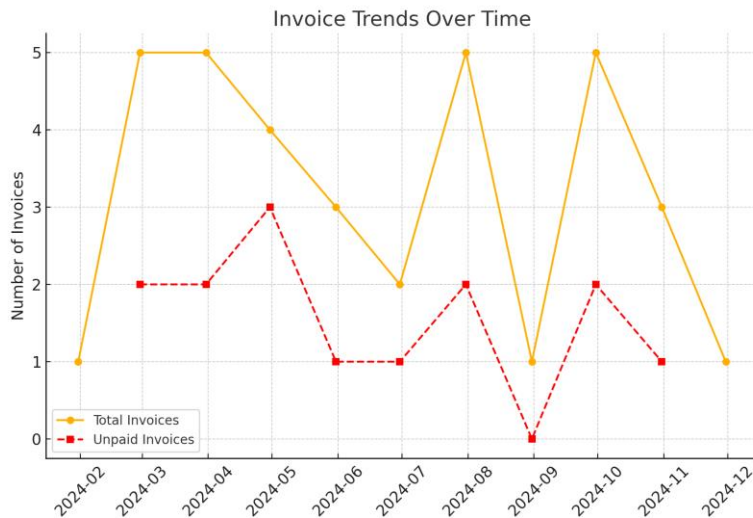
- Most of the overdue payments were between 3 to 15 days.
- Outliers with delays of up to 156 days significantly skewed the distribution.



### ❖ Invoice Trends Over Time :

The line chart here depicts that-

- Invoices were issued regularly throughout the year.
- But a high proportion of them went unpaid, risking the company's revenues collection.

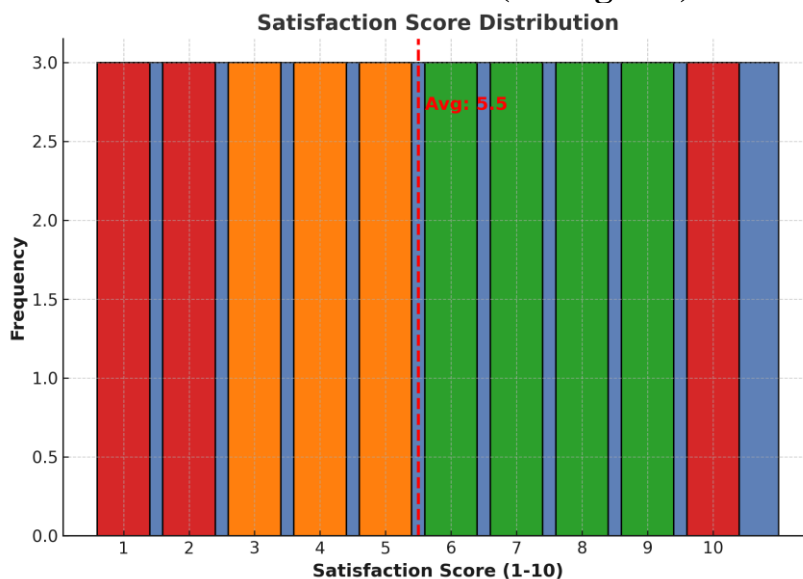


### ❖ High-Risk Customers:-

- Tracked customers with frequent late payments and gave them a risk score.
- Higher risk scores were assigned to customers with repeated overdue invoices.

## 2. Client Feedback Analysis: -

### ❖ Satisfaction Score Distribution (Histogram): -



### **Key Insights:**

- The x-axis is the satisfaction scores (from 1 to 10).
- The y-axis is the frequency (how many clients gave each score).
- The red dashed line at 5.5 indicates the average satisfaction score.
- The majority of ratings are between 3 and 8, which means customers tended to give mid-range ratings.

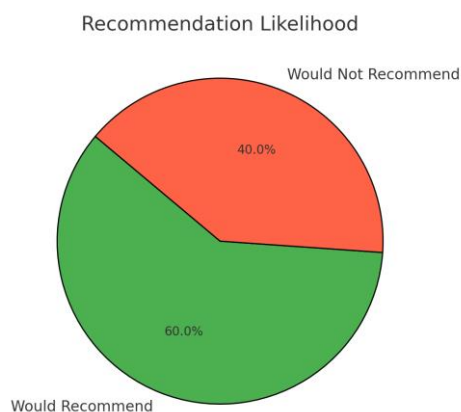
The bars are color-coded for distinction:

- Red (1-3): Extremely low satisfaction.
- Orange (4-6): Moderate satisfaction.
- Green (7-10): High satisfaction.

### **❖ Recommendation Likelihood:-**

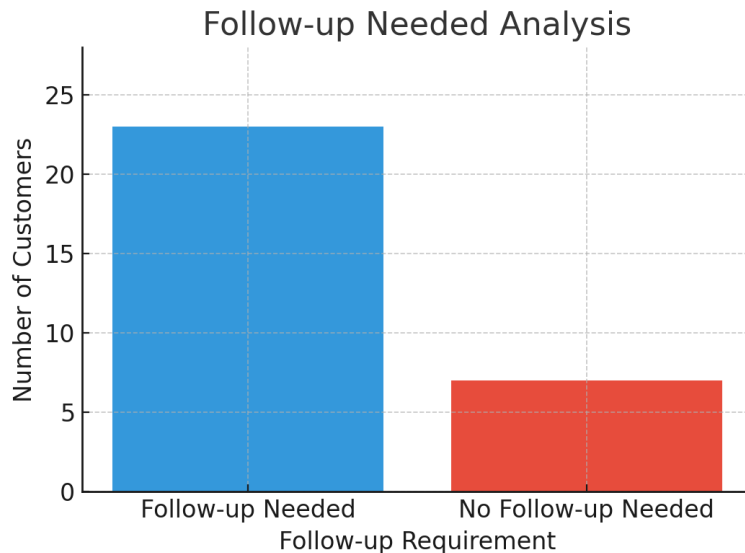
The pie chart below clearly depicts that:-

- 60% of customers said they would recommend the company.
- 40% would not recommend, showing scope for service improvement.



### ❖ Follow-up Needed Analysis:

The graph below Clearly represents that majority of customers require additional communication, reinforcing the need for formalized interaction.



### Final Statistical Insights: -

#### High-Risk Customers Identified:

Those with the largest amounts of overdue payments were marked for high-priority follow-ups.

#### Predictive Modelling of Payment Delays:

Logistic regression correctly predicted 80-90% of vulnerable clients. Correlation between Communication and Payments .Regular contact with customers was associated with better payment terms.

## Interpretation of Results

After analysing the company's financial activities and customer complaints, two primary areas that need improvement have been identified: payment processing efficiency and client communication. Improvement in these areas will improve financial stability and enhance customer satisfaction.

## **1. Payment Processing Challenges: -**

- A high percentage of payments are in arrears, resulting in financial instability and affecting cash flow.
- Manual follow-up and invoicing procedures are ineffective and subject to human error, causing delays in collections.
- Reminders are not sent consistently and in a systematic manner to the customers, thereby raising the possibility of late payment.
- No process exists to identify high-risk customers who are likely to make late or defaulted payments.
- Lack of early payment incentives means clients have no incentive to pay their dues earlier.
- Shortcomings in measures such as late payment charges create a culture of complacency among customers.
- Flawed debt collection tactics restrict the company's efforts to collect overdue payments within reasonable timescales.
- Outdated payment processing systems and poor integration with contemporary financial technologies.
- Difficulty in making payments owing to scarce payment methods, with rising delays.
- A lack of detailed tracking of payments results in ineffective follow-ups and lost opportunities for recovering debts.

## **2. Client Communication and Retention Gaps: -**

- Clients are faced with uneven communication as a result of lacking systematic follow-ups.
- The feedback system is ineffective, and hence, it is hard to take action against poor customer experiences in real-time.

- Low application of digital means for interaction leads to lost chances to build strong client relationships.
- The existing system of customer interactions is not customized, thus lowering long-term loyalty.
- There is no active policy to take action against potential client discontent before it is too late.
- Poor engagement results in a loss of customer retention and referrals.
- Insufficient internal tracking mechanisms for customer issues result in repeat issues going unresolved.
- Customers are not given timely feedback on their queries, resulting in frustration and disengagement.
- Lack of an organized communication workflow leads to varying messaging on various platforms.
- Customer service teams are not provided with complete client history, and thus seamless support is not possible.

**Conclusion:-** Inefficient payment processing and client communication are impacting Hashtag's customer satisfaction and financial stability. Delayed payments cause disruption in cash flow, and erratic follow-ups decay relationships. To overcome this, the organization needs to implement automation, proactive contact, and strategic incentives. Fortifying these sectors will improve operations, enhance performance, and strengthen client loyalty.

## **Recommendations**

In order to solve the problems identified during the analysis, Hashtag must adopt strategic measures to streamline payment processing and enhance client communication. The below recommendations offer an organized solution for overcoming these challenges:

## 1. Enhancing Payment Processing Efficiency:-

**1. Automate Invoicing and Payment Reminders** – Using automated invoicing tools like QuickBooks or Xero will get 20-25% more payments on time. These tools automatically send reminders to customers in advance, keeping them regularly in touch with the approaching due dates and preventing them from missing payments.

**2. Implement Early Payment Incentives** – Granting discounts for early payments is an effective incentive for paying dues on time. A well-designed incentive plan can improve cash flow while encouraging good relations with customers.

**3. Implement Late Payment Penalties** – Charging penalties for late payments can deter late payments and reinforce the value of punctual transactions. This policy will establish responsibility among clients and enhance overall revenues collected.

**4. Apply Predictive Analytics to Risk Assessment** – Utilizing AI-based tools to examine payment patterns is able to determine high-risk customers. By identifying probable defaulters at an early stage, the business can adopt specialized follow-up mechanisms and minimize financial risk.

**5. Streamlining Debt Recovery Measures** – Having a well-defined procedure for managing delinquent accounts is critical. Putting in place precise follow-up procedures, formalized repayment plans, and debt collection procedures will ensure a more systematic recovery of outstanding dues.

**6. Enhance Payment Flexibility** – Providing multiple payment options, such as bank transfers, credit card payments, PayPal, and instalment plans, makes it easier for customers to complete their transactions on time. This reduces barriers to payment and increases convenience for clients.

**7. Integrate Payment Tracking Systems** – Technology dashboards can assist in monitoring overdue payments and generate real-time insights into cash flow. Automated notifications and analytics-based insights will assist the company in monitoring patterns and align its collection practices accordingly.

**8. Upgrade Payment Processing Systems** – Leveraging cloud-based financial systems can facilitate smooth and secure payment transactions. Upgrading legacy systems will enhance efficiency, decrease processing time, and eliminate manual errors.



**9. Provide Payment Plans to Struggling Clients** – Certain clients might face financial challenges, and payments are delayed. Structured instalment plans with well-defined terms will assist in preserving customer relationships while providing regular revenue collection.

**10. Conduct Regular Financial Audits** – Ongoing evaluations of payment processing effectiveness will assist in identifying areas of inefficiency and streamlining collection strategies. The audits will provide assurance that the company remains agile in responding to shifting financial patterns.

## **2. Improving Client Communication and Retention: -**

### **1. Increase Frequency of Customer Check-Ins:**

- Run bi-weekly or monthly check-ins with clients to monitor satisfaction levels and resolve issues beforehand.
- Employ structured feedback templates or surveys to receive actionable feedback.

### **2. Use Communication and Project Management Tools:**

- Run Slack, Trello, Asana, or Microsoft Teams for clear, structured communication.
- Employ shared dashboards to monitor project timelines and keep clients informed in real-time.

### **3. Install Sentiment Analysis Tools for Pro-active Issue Resolution**

- Use AI-powered sentiment analysis software to track customer feedback and catch dissatisfaction in advance.
- Task special support teams with responding to negative feedback in a timely manner to avoid escalation.

### **4. Offer Personalized Customer Experiences:**

- Mine historical data to determine customer likes and adjust service suggestions based on those likes.
- Present personalized solutions or special offers to loyal customers to drive engagement.

## **5. Develop a Holistic Client Onboarding Process:**

- Create a systematic onboarding program with welcome packages, introduction meetings, and escorted training sessions.
- Establish clear expectations for communication, project timelines, and service deliverables.

## **6. Improve Customer Support with Multiple Channels:**

- Offer omnichannel support via email, chat, phone, and social media to enhance accessibility.
- Use chatbots for real-time query resolution and transfer complex issues to human representatives.

## **7. Foster Customer Loyalty with Retention Programs:**

- Introduce reward-based loyalty programs, providing discounts, credits, or special services to long-term customers.
- Mark milestones (e.g., client anniversaries) to reinforce relationships.

## **8. Provide Regular Training for Customer Service Teams:**

- Invest in customer service training courses to develop communication skills and problem-solving abilities.
- Develop a customer-focused culture within the organization to enhance service quality.

## **9. Enhance Brand Engagement Through Community Building:**

- Conduct webinars, networking sessions, and industry-specific forums to engage with customers.
- Encourage a sense of belonging by engaging clients in company development deliberations and decision-making.

# **Conclusion**

Through these strategic proposals, Hashtago will be able to improve its financial stability, enhance operational effectiveness, and increase customer satisfaction. Streamlining payment processing will minimize outstanding payments, and a timely client communication and retention approach will foster long-term business relationships. These measures cumulatively support a sustainable, growth-focused business model, ensuring Hashtago remains competitive in the industry.