

# Internal Marketing Practice Efficacy and Human Resource Effectiveness in a Logistic Firm Using a Machine Learning Approach

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## ABSTRACT

Internal marketing (IM) is concerned with attracting and retaining customer oriented employees. Internal marketing detractors argue that the term is simply a euphemism for good human resource management. Internal marketing and human resource effectiveness (HRE) concepts are considered at both a strategic and technical level, and appropriate measures are identified. Employees are important clients, so don't neglect them. In this reference, anticipate business rebate programmes, promotional deals, and even specimens that will all contribute to increasing your employees' sense of belonging while also enabling them to profit from the fruits of their labour. In today's world, every profitable business places a high value on human resource management and internal marketing because they recognise the value of those activities and the strategic advantage they can bring to the organisation. Internal Marketing (IM) is a new and emerging discipline that is being used in a variety of businesses to improve the role of the employee. The goal of this research is to determine the effect of internal marketing on employee satisfaction. Data on various aspects of employee fulfilment and promotional strategies is gathered. Because Machine Learning (ML) is on the cusp of having a significant impact on professional and personal relationships, a comparison of various ML algorithms is conducted in order to predict staff morale with precision, accuracy, and recall. Finally, using the Technique for Order Preference by Similarity to Ideal Solution, the models are ranked (TOPSIS). A case of well-known logistic firm, Leading Logistics is considered to validate ML models and its accuracy. The study provides empirical support for the existence of a valid and distinct distinction between IM and HRE, as well as the importance of IM as a precursor to HRE. We will also explore the correlation between internal distribution and employee satisfaction.

**Keywords :** Internal Marketing, Employee Satisfaction, Human Resource Effectiveness, Machine Learning, 9  
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## Introduction

Although information management (IM) is not a new concept (Sasser and Arbeit, 1976), it has only recently gained traction in public and private sector organizations. While an increasing number of researchers propose using IM as a mechanism to develop customer-conscious and motivated employees (George, 1977, 1986, 1990; Grönroos, 1981, 1982, 1985; Berry, 1984; George and Compton, 1985; Piercy, 1991, 1995; Piercy and Morgan, 1991; Ahmed and Rafiq, 1993, 1995; Helman and Payne, 1995), little evidence is available. Despite the excitement surrounding IM's

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potential contribution to business effectiveness and performance, as well as the importance of. There is no clear empirical evidence of a positive relationship between IM practices and organizational effectiveness and performance, despite the IM linkages to market-oriented attitudes expressed in previous literature. There has been even less research into the mechanics of this

linkage. As a result, generalizing the extent to which the implementation of IM and related business strategies actually impacts organizational performance is difficult. Human resource (HR) management is one of the most important factors in enhancing a company's performance. Entrepreneurs may be experts in their fields, but they may be novices when it comes to employee management. As a result, the presence of HR is required. An experienced human resources manager can not only resolve organizational behavior conflicts, but also attract a large number of talented employees. A successful human resources department can create an efficient recruiting process and increase a company's overall productivity. According to recent reports, 83 percent of HR leaders have sway over company decisions. HR departments are becoming increasingly important in the creation of an effective organization, as more and more business owners recognize. Although most company directors are aware of the benefits of human resources, they are unsure of how to measure their effectiveness. Furthermore, they have no idea how to improve HR effectiveness after evaluating it. What are the key performance indicators (KPIs) for this metric? What are the strategies for improving human resource performance? This article will discuss key indicators and techniques for measuring and improving HR effectiveness. In this case, the employee represents the client, and all the noble aspects that being a client entails. Hence, internal marketing translates into a real willingness to adapt working conditions to the employees' needs, to offer them a “product” that corresponds to their needs and to their expectations. It is a way to ensure “customer loyalty”, or in other words, to engage employees and to increase your retention rate. For some, the internal marketing approach may seem like a vicious cycle, an illogical reversal of the workplace. It is quite the opposite! Remember that

is a *virtuous* cycle – a set of procedures that improve a situation. No company can say no to that!

### **Key Indicators of HR Effectiveness**

*Employee Retention is one of the three most important indicators of HR effectiveness.*

As job-hopping among millennials becomes more common, human resources plays a critical role in retaining current talent. Only 5% of organizations believe they are effective at maintaining a high employee retention rate, according to the CEB Corporate Leadership Council's 2016 research reports. The number of employees who stay with a company during a given time period is referred to as the employee retention rate. It is one of the most commonly used measures of HR effectiveness because it demonstrates the department's hiring efficiency (in other words, the department is finding employees who are qualified).

Suitable for the company). It also denotes a pleasant working environment—the more agreeable the working environment, the fewer employees are likely to leave. Furthermore, the employee retention rate is simple to calculate and can be analysed on a regular basis. As a result, employee retention has emerged as the most commonly used KPI in assessing HR effectiveness.

### **Employee Contentment**

Another important indicator of HR effectiveness is employee satisfaction. What do employees think of the company culture? Are all organizational conflicts satisfactorily resolved? Is it possible for all departments to communicate effectively?

These are critical questions that have an impact on employee satisfaction. Employees who are

satisfied will be more productive. HR is in charge of resolving these internal issues so that the company runs smoothly and efficiently. Employee satisfaction is more difficult to quantify than employee retention rate due to its subjectivity. An anonymous survey is a popular way to gauge employee satisfaction. Anonymity enables employees to express their true feelings, allowing the survey to produce the most accurate results.

### Corporate Culture

HR's primary responsibility is to foster a strong company culture. Each company has its own distinct company culture, such as equality, innovation, and creativity, and so forth. A strong company culture fosters a sense of belonging in employees, providing them with a sense of "identity" or "home." However, company culture is the most difficult of the three indicators to assess because data is difficult to collect and analyze. To assess company culture, we can look at common values like transparency, diversity, and equality to see if a company lives up to its values in daily practices like promotion. Employee retention and satisfaction rates that are high are also indicators of a strong company culture. Although the measurement process can be costly and time-consuming, it is worthwhile to invest in HR evaluation.

The effectiveness of human resources is directly related to the performance of a company. In other words, HR effectiveness determines whether the company has effective communications, appropriate recruiting processes, and productive employees. As a result, assessing HR effectiveness is an important step in improving a company's overall strategic development.

### How to Boost HR Effectiveness

After assessing HR effectiveness, a company

should consider its shortcomings and try to implement new strategies to improve HR performance. Here are some pointers to help you improve your HR effectiveness.

1. Improve internal communication within the organization
2. Create an efficient training program.
3. Give employees more frequent feedback.
4. Create a cultural vision for your company.
5. Make use of available technology.

Using data to improve HR effectiveness is largely dependent on a company's specific situation. Improving organizational communication, for example, is dependent on the company's size and structure; developing an effective training program necessitates knowing the exact number of new employees and their specialties; and developing a cultural vision is based on the company's mission and overarching goals. Do you want to learn more about evaluating and improving HR effectiveness? [Click here to speak with a Core Axis specialist about measuring your HR effectiveness and customizing your improvement strategies!](#)

In reality, internal marketing is a skilful way to apply your business strategy in-house. Make sure to establish a constant dialogue with your employees in order to better understand them and to offer them working conditions that meet their needs. You have been warned: when marketing and HR management join forces, results! The concept of internal marketing is a tool that companies use within their workforce to communicate with their employees. Many company owners and authors of internal marketing believe this concept is as important to a company's survival as external marketing (communicating to customers). When communicating to employees this involves the communications of "corporate culture and goals, mission and vision statements, as well as personnel

policies and procedures “*Internal marketing is orienting a motivating customer contact employees and supporting service people to work as a team to provide customer satisfaction (Kotler and Armstrong 2010- add in ref section)*. It has long been said that an organisation's most important asset is its people. Employees define a company, shape its culture, and often prove to be its most valuable source of inspiration, ideas, and 'shop floor' insights

In recent years, this mindset has changed. Now, in the era of digital transformation, it is believed an 'organisations biggest asset is its human capital and data is the key to protect organisations' most valuable asset. People of organisation will be the driver of businesses, but this changing era of automation, robotics and artificial intelligence will make people more powerful to make future inferences. Role of the human resource team is changing as the ability to gather and analyze ever-increasing amounts of data grows, so are the opportunities for people to add more value to the organization. This is what makes human resource data such an important asset. Data is what shapes products and services, improves customer experiences, and ultimately defines brands. Over the last 12 months, machine learning and artificial intelligence has dominated much of the conversation around how technology and data will shape the way people live and work in the years to come.

The term "Machine Learning" was coined by Arthur Samuel, a pioneer in the field of artificial intelligence and computer gaming. He defined machine learning as a "field of study that allows computers to learn without being explicitly programmed." Machine learning (ML) is the scientific study of algorithms and statistical models used by computer systems to perform a specific task without using explicit instructions, instead

relying on patterns and inferences. Machine learning is about to have a significant impact on workplace communication systems. Improving the employee's role within an organisation. Consider the possibility of a sales representative or contact centre employee. A sales representative will know when and where to tailor their communications approach by using machine learning patterns—understanding how much they might also speak and how much people should hear. The process begins with providing high-quality data, which is then used to train our machines (computers) by creating machine learning models based on the data and various algorithms. The algorithms we use are determined by the type of data we have and the task we are attempting to automate. Machine Learning is now being used by businesses to improve business decisions, increase productivity, detect disease, forecast weather, and a variety of other tasks. In this paper, we look at how various aspects of internal marketing, such as recognition, appraisal, promotion, and salary, affect employee job satisfaction. The following section explains how to use Machine Learning to solve problems in general.

### **Objective:**

- The objective of our study is to predict using Machine learning the impact of internal marketing on the satisfaction level in an employee.
- To find out, whether there is correlation between internal distribution and employee satisfaction.

### **Hypothesis:**

H1: internal marketing has a high positive impact on employee satisfaction

H2: The internal distribution and employee

satisfaction are positive on the linear scale.

### Literature study:

According to Naver and Slater (1990), a strong market orientation in a business leads to greater effort being used in delivering superior value to customers on an ongoing basis, and thus there is a greater probability that better value will be provided. As a result, customers may perceive this as a viable benefit. It results in improved organizational performance. It also results in improved organizational performance. Employee satisfaction contributes to some of the superior performance because it increases the attraction and retention of the best employees. It improves the organization's ability to provide high-quality service (Berry, 1981). Berry and Parasuraman). Similarly, Gronroos (1981) believes that all employee satisfaction results in highly motivated and customer-conscious employees. It also leads to better service quality and organizational performance. Individual or specific competency development will also result in improved and dependable work quality, as well as the ability to customize products and thus meet customer needs more accurately. This can help you improve an individual's self-effect. This can also boost organizational performance (Conger and Kanungo, 1988; Rafiq and Ahmed, 2000). Internal marketing (IM) is concerned with attracting and retaining customer oriented employees. Internal marketing detractors argue that the term is simply a euphemism for good human resource management. Internal marketing and human resource effectiveness (HRE) concepts are considered at both a strategic and technical level, and appropriate measures are identified. Albert Caruana, Michael T. Ewing (1999).

Internal marketing is a type of marketing that is aimed at employees within a company. Internal

marketing is the task of hiring, training, and motivating employees in order to better serve customers. Internal marketing's goal is to treat employees as a customer group. Great organizations make even the most insignificant employees feel good. Internal marketing must come first, followed by external marketing. It makes no sense to provide excellent service before the company's staff is prepared to do so. Varun Kumar is an Indian businessman (2017)

The origins of internal marketing (IM) constructs, as well as some disagreements and controversies surrounding the internal marketing philosophy. Some of the disagreements and arguments raised concerned internal marketing as a human resource management (HRM) approach; similarities between IMO and external marketing; and as well as mutual misunderstandings in marketing and government administration Emmanuel Selase Asamoah, Theophilus Francis Gyepi-Garbrah (2014) Generally, industrial marketing is viewed from the perspective of firms marketing to other firms. Organizations, on the other hand, devote significant resources to situations in which managers market their capabilities to other units within the same firm. Presents an industrial health and safety case study to highlight internal marketing concepts that managers and staff professionals should use to strengthen their internal contribution to company goals. Matthew F. Fors, Gilbert D. Harrell (1995)

Employees, according to internal marketing, are internal customers. Employees are satisfied with the organization's human resource management practices, internal services, and coworker harmony. As a result, organizations use internal marketing activities to increase employees' motivation, dedication, participation, and job satisfaction. Employees' superior performance contributes to the organization's higher-quality

performance and influences external customers' perceptions of service quality. Despite the fact that internal marketing focuses on employees as internal customers and attempts to meet their needs, the main goal of internal marketing is to improve service quality for external customers in order to have a loyal base of satisfied clients. which contributes to increasing revenues, decreasing costs, and increasing market share, and so on. Chandrika, P. (2017)

### Case Study Discussion

The term "psychological contract" comes from the works of who used it to describe the relationship between a group of employees and their superior. Rousseau considers psychological research to employee mental models, mutuality, and effectiveness to be the fundamental elements of psychological theories. A psychological contract is made up of two parts. The first is employee satisfaction, and the second is employee commitment. Both of these factors capture individual employees' emotional attachment to their organization. Human capital is the human factor in a business. It can provide the company with a combination of intelligence, skills, and knowledge. According to researchers, human capital is the most important value of a company because it is a resource of creativity that brings new innovations, changes, and improvements. Companies frequently focus on human capital as a source of new opportunities and innovation. Human capital also adds an emotional connection to a company. A psychological contract is an emotional relationship between an employer and an employee that measures the commitment of the organization. Leading Logistics Company, India the flagship company of company is an instrument in providing innovative and value added solutions for Indian Corporate and Multinationals. It is the only leading Multi-modal logistics company with

single window integrated logistics services for all the element of the supply chain management in India. Leading Logistics Company is committed to offer logistics solutions and services to the Indian Industry designed to customer's satisfaction in order to help, support and grow together in a win-win situation. To redefine customer satisfaction, herald a rationalized approach of time & cost and eventually bridge the gap between Indian requirements and global standards. Logistics Company, with its flexible set-up of transportation, offers manufacturers a number of opportunities to improve their supply chain radius across India. This can easily be regarded as one of the most significant strengths of Leading Logistics Company, as manufacturers have a real chance of saving their capital investment by way of reducing the overall cost of inventory. Logistics Company connects over a thousand destinations across the country. In addition to that, the company also owns a dedicated fleet when it comes to local distribution. According to the study, the competitors of the company have a high turnover ratio. This affects their goodwill because a high turnover comes with a number of detrimental effects for an organization. For instance, it becomes challenging to replace specific employees who are business domain experts or possess niche skill sets. The research aims to explore all the reasons behind this data. The issue of employee turnover is quite prominent in organizations in the present times due to its negative impacts on a number of problems ranging from productivity to workplace morale. It even causes disruptions in long-term growth strategies and project continuity.

It is noteworthy that employee retention has also become a significant concern for most corporates. Once employees are trained, they tend to move on to other companies for better prospects. Comfortable timings, lucrative salary, scope of growth and better ambience are some factors that prompt individuals to seek a change. When talented

employees are willing to move on, the HR team and management is responsible for intervening and finding out the precise reasons that led to this decision. The management team of Leading Logistics Company comprises industry experts and savvy entrepreneurs, bringing years of experience with them to the company. Moreover, they work tirelessly and cultivate a strong culture to assist the team in growing and succeeding. The core team members also offer their vision and leadership to the other team members.

Research shows that the turnover ratio of the company is very low and employee retention is very high. Hence, this study aims to analyze how employers of the company motivate the employees to make them comfortable, leading to enhanced employee retention. Since the study is focusing on a specialised group of employees, the population is relatively small and validity and reliability issues could result in challenges further reducing the sample size. Since all employees employed with leading Logistics Company are situated in their head office, a person-administered survey was selected. This would allow the researcher to conduct the survey personally with employees to ensure that all questions and instructions were clearly understood and answered in full.

### **Machine Learning Approach**

The controllable elements (i.e., the IM mix) are used to influence key target groups identified as employees (or internal customers), which are equivalent to key customer segments in external marketing. The term 'internal marketing mix' is preferred over Galpin's term 'the influence system' because it better reflects the controllable nature of these elements and the need for them to be mixed appropriately to achieve the desired results. In this framework, the desired outcomes of the IM program are identified as 'competencies' that will

ultimately affect business performance. The study investigates the relationship between the IM mix, organizational competencies, and the external marketing application framework, as well as their effects on business performance. To begin, the model indicates that the IM mix variable is related to organizational performance in a positive way. Second, organizational competencies serve as a bridge between the IM mix and business performance.

The model also proposes that using external marketing philosophy and tools moderates the relationship between the IM mix and organizational competencies. This is consistent with the research. Grönroos and George (1989) clearly state that IM is basically a philosophy for managing the organisation's human resources based on a marketing perspective. Berry and Parasuraman (1991).

Arthur Samuel, an IBM scientist and pioneer in computer gaming and artificial intelligence, coined the term "Machine Learning" in 1959. Machine learning is classified as a sub-discipline of artificial intelligence. It aims to use experience to automatically improve the performance of computer algorithms designed for specific tasks. The experience in a machine learning study is derived from the training data, which can be defined as sample data collected on previously recorded observations or live feedbacks. Machine learning algorithms can learn and build mathematical models based on this experience to make predictions and decisions.

Because of the constant advancements in artificial intelligence, the field has grown too large to specialize in entirely. There are a plethora of problems that can be solved using a plethora of methods. Knowledge gained by an experienced AI researcher specializing in one field may be mostly

useless in another. Understanding the nature of various machine learning problems is critical. Despite the fact that the list of machine learning problems is lengthy and impossible to explain in a single post, we can categorize these problems into four distinct learning approaches:

- Learning that is supervised;
- Learning that is Unsupervised;
- Learning that is semi-supervised; and
- Reinforcement Learning is a type of learning that uses positive reinforcement.

ML algorithms are frequently classified as either supervised or unsupervised. Supervised machine learning algorithms apply what has been learned in the past to new data via labelled examples in order to predict future events. The learning algorithm generates an inferred function to predict output values based on an analysis of a known training dataset. Unsupervised machine learning algorithms, on the other hand, are used when the information used to train is neither classified nor labelled. The system does not determine the appropriate output, but it explores the data and can draw inferences from datasets to describe hidden structures in unlabelled data. In some cases, two additional approaches are used. These are semi-supervised machine learning and reinforcement learning algorithms. List of Frequently Used Machine Learning Algorithms. Because it uses both labelled and unlabelled data for training – typically a small amount of labelled data and a large amount of unlabelled data – the former falls somewhere between supervised and unsupervised learning. Reinforcement machine learning algorithms are a type of learning algorithm that interacts with its surroundings by generating actions and detecting errors or rewards. The most important characteristics of reinforcement learning are trial and error search and delayed reward.

The following is a list of commonly used machine learning algorithms. These algorithms can be used to solve nearly any data problem:

- Linear Regression,
- Logistic Regression,
- Decision Tree,
- Support Vector Machine,
- Naive Bayes,
- Neural Networks,
- K-Means,
- Random Forest
- Dimensionality Reduction Algorithms
- Gradient Boosting algorithms etc.

In this paper, we have used supervised machine learning techniques for predicting employee satisfaction given his age, salary and his rating of internal marketing parameters reward, promotion, appraisal and recognition. The supervised learning models work by taking a set of labelled examples (training set) and discovering a function  $f$  that predicts the class for a new example (test set).

When a dataset contains records of the response variable values, the supervised learning approach can be used (or labels). Depending on the context, this labelled data is referred to as "labelled data" or "training data."

Example 1: To predict a person's height based on his weight, age, and gender, we need training data that includes people's weight, age, and gender information, as well as their actual heights. This information enables the machine learning algorithm to determine the relationship between height and the other variables. The model can then predict a person's height based on this information. The implementations of these models are available in R. R is a free and open source software licensed under GNU GPL. A brief of models is presented

below subsections.

### **Binary Logistic Regression**

In general, logistic regression refers to binary logistic regression with binary target variables, but it can also predict two other types of target variables. Binomial or binary

In this type of classification, a dependent variable will only have two possible values: 1 or 0. These variables could, for example, represent success or failure, yes or no, win or loss, and so on. Binary Logistic Regression is a classification algorithm which is used when we want to predict a categorical dependent variable. The dependent variable in a binary logistic regression model has two levels (categorical). Multinomial logistic regression is used to model outputs with more than two values, and ordinal logistic regression is used

$$\Pr(Y_i = 1 | X_i = x_i) = \frac{\exp(\beta_0 + \beta_1 x_i)}{1 + \exp(\beta_0 + \beta_1 x_i)}$$

or

$$\log \text{it}(\pi_i) = \log \left( \frac{\pi_i}{1 - \pi_i} \right)$$

Distribution of  $Y_i$  is  $\text{Bin}(n_i, \pi_i)$ , i.e., binary logistic regression model assumes binomial distribution of the response.

### **Decision Tree**

Decision trees are one of the popular supervised machine learning algorithms. This is one of my favourite algorithms. It is a supervised learning algorithm that is commonly used to solve classification problems. It works for both categorical and continuous dependent variables, which is surprising. We divide the population into two or more homogeneous sets using this algorithm. This is done based on the most

important attributes/independent variables in order to create as many distinct groups as possible. They have been widely used for classification and regression problems. Decision trees work very similar to the way the human brain thinks by dividing the problem into sub problems which makes them easy to understand. They work in a recursive manner by partitioning the dataset into smaller datasets on the basis of feature values until the final output is obtained. At every step, the aim is to partition the set in best possible manner i.e. that gives maximum amount of information (or reduces the level of uncertainty). A CART (Classification and Regression Trees) algorithm [D3] is used to build the decision tree model by recursively

splitting the dataset around a feature that gives maximum reduction in the heterogeneity of the

$$\text{Gini Index} = p(i)(1-p(i)) \text{ for } i = 1 \text{ to } K,$$

Where  $K$  is the number of classes of response variable and  $p(i)$  is the probability of class  $i$  at a node.

### *Random Forest*

Random forest is a popular machine learning model that works well for both classification and regression problems. It is an ensemble method proposed by Breiman [3]. During the learning phase, the algorithm works by bootstrapping multiple samples from the training data set and then creating independent decision trees for each of the bootstrapped sample. While constructing a decision tree, the algorithm randomly selects a subset of features/variables and finds out the best feature for splitting the node in that subset.

### *Support Vector Machine*

Support Vector Machine, or SVM, is a popular Supervised Learning algorithm that is used for both classification and regression problems. However, it is primarily used in Machine Learning for Classification problems.

The SVM algorithm's goal is to find the best line or decision boundary for categorizing  $n$ -dimensional space so that we can easily place new data points in the correct category in the future. A hyper plane is the best decision boundary. Support Vector Machine takes numeric input and binary output. It is based on finding a linear plane with maximum margin to separate two classes of output. Categorical input can be turned into numeric input

response variable. At every step, the heterogeneity of a node is determined using Gini Index.

as before and categorical output can be modelled as multiple binary output. With a different loss function, SVM can also do regression (called SVR). I haven't used this myself so I can't talk much. The strength of SVM is it can handle large number of dimensions. With the kernel function, it can handle non-linear relationships as well.

### **Model Evaluation**

Model evaluation is an essential step in the model development process. It aids in determining the best model to represent our data and how well the chosen model will perform in the future. In data science, evaluating model performance with the data used for training is not acceptable because it can easily produce over optimistic and over fitted models. In data science, there are two methods for evaluating models: hold-out and cross-validation. To avoid over fitting, both methods evaluate model performance using a test set (unseen by the model). The most important part of a classification prediction study is to evaluate the performance of the classifier. There are numerous metrics available for evaluating a classifier; some are more suitable than others depending upon the context of their use. The formula applied for all the models is given by:

$$\text{Satisfaction} \sim \text{Age} + \text{Pay} + \text{Recognition} + \text{Appraisal} + \text{Reward} + \text{Promotion}$$

Accuracy and sensitivity of the models are measured to evaluate the performance of the models used. These measures are discussed in the following subsections.

### Metrics Used

Accuracy is the ratio between the number of samples correctly predicted and the total number of samples classified. The formula for calculating accuracy is

$$\text{Accuracy} = \frac{\text{No of correct predictions}}{\text{Total no of predictions made}}$$

However, accuracy may not be a good measure if there is high variance in the number of objects in the classes or unbalanced datasets. Sensitivity measures are based on the confusion matrix. The confusion matrix shows the complete performance of the model. It is a matrix of size n x n representing the numbers of patterns of class : predicted in class j

**Table 1.** The Confusion Matrix

As shown in the Table 1, there are four cases:

- True Positives: Number of cases that are predicted YES and actual output is YES.
- True Negatives: Number of cases that are predicted NO and actual output is NO.

	<b>Predicted: YES</b>	<b>Predicted: NO</b>
<b>Actual: YES</b>	True Positives	False Negatives
<b>Actual: NO</b>	False Positives	True Negatives

- False Positives: Number of cases that are predicted YES and actual output is NO.
- False Negatives: Number of cases that are predicted as NO and actual output is YES.

Sensitivity is also known as the true positive rate (TPR). This measure tells us the percentage of employees that are correctly identified as satisfied employees.

Sensitivity =  $\frac{\text{No. of true positives}}{\text{No. of true positives} + \text{No. of false negatives}}$  (2)

In this paper, we have used K-fold cross validation for measuring the performance of the predictive

models over new data. In K-fold CV, the original sample data set is divided into k equal size subsets. Out of the k subsets, one subset is retained as validation set and the remaining (k-1) subsets are used for training the model. The process is repeated k times (the folds) while making sure that each subset is used as validation set exactly once. The evaluation metrics accuracy and sensitivity are computed for each run and then averaged to produce a single estimation.

### Model Selection

In this paper, we have used TOPSIS (Technique for Order Preference by Similarity to Ideal Solution) method for selecting the best machine learning

model based on their performance in terms of accuracy and sensitivity.

It is a compensatory aggregation method that compares a set of alternatives by calculating the geometric distance between each alternative and the ideal alternative, which has the highest score in each criterion. TOPSIS makes the assumption that the criteria increase or decrease monotonically. In multi-criteria problems, normalisation is usually required because the parameters or criteria are frequently of incongruous dimensions. TOPSIS and other compensatory methods allow for trade-offs between criteria, where a poor result in one criterion can be offset by a good result in another. Non-compensatory methods, which include or exclude alternative solutions based on hard cut-offs, provide a more realistic form of modelling. A nuclear power plant application example is provided in. TOPSIS is a multiple criteria decision-

making (MCDM) technique that was first developed in 1981 by Yoon and Hwang. TOPSIS is founded on the notion that the preferred alternative should be the one with the shortest geometric distance from the positive ideal solution and the one with the greatest geometric distance from the negative ideal solution .

**Results**

In this section, the results of all four machine learning models on the given dataset have been analysed. The accuracy has been computed using the equation 1 and sensitivity has been calculated using equation 2 for every model used. As discussed in section , performance of the models used was further analysed using TOPSIS to select the optimal model for our case. The table 2 shows the results.

**Table 2 :** Performance comparison of all models.

<b>Models</b>	<b>Accuracy (%)</b>	<b>Sensitivity</b>	<b>Rank given by TOPSIS</b>
<b>Random Forest</b>	87.3	0.89	1
<b>Decision Tree</b>	81.1	0.85	2
<b>Support Vector Machine</b>	78.5	0.84	3
<b>Binary Logistic Regression</b>	77.0	0.84	4

As shown in Table 2 , random forest performs best among all models while Binary Logistic Regression performing the worst. Random forest gives good sensitivity score of 0.89.

**Conclusion**

The current section of a research highlights the completion of the exploration work done in previous sections as well as the making of inductions. The entire execution premise has been done in a completely different conclusion and that

are framed, and the future extension for the current work is discussed. With the approach used in this study, the entire effect of the internal marketing campaign on employee efficiency is primarily addressed. The paper summarizes the research questions, hypotheses, and appropriate research objectives. Finally, the current study's goal is achieved through a questionnaire survey. The current study concludes that the entire significance of marketing logistics lies in a way that prompts extreme fulfilment of the deal. The ultimate significance of marketing logistics and internal

marketing is carved out by selecting Leading Logistics Company as a study area. Leading Logistics Company simply provides the best supply chain services in India and around the world.

Finally, integration of marketing logistics and internal marketing is required for the company's goals to be met. The overall integration ensures that both inter-organizational and intra-organizational operations are coordinated, resulting in higher performance. This present study further concludes that internal marketing can be an important source of easy support for endorsing executives in a global competitive environment. The effectiveness of administration is a primary goal for the majority of aid organizations, and this can also rely on the workers' exhibition to convey excellent items on administration experiences. Essentially, the current study intends to audit a writing on internal marketing and then attempt to explain the opportunity and hypothetically discuss certain issues identified with internal marketing idea, degree, and also the bonding and connection with a company's human assets.

We have successfully demonstrated the application of four popular machine learning models for predicting the employee satisfaction for Leading Logistics Company.

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