

# Vendor Management System using Machine Learning

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**Abstract** - Vendor Dashboard is a smart way of managing multiple vendors which will be used by OEM (Original Equipment Manufacturer) to monitor and manage them in the manufacturing industry in an efficient and easier manner. It is the application which acts as a mechanism for identifying an ideal vendor to improve Quality Assurance and Quality Control of products delivered by Vendor. Typical features of a Vendor Management System application include order distribution, consolidated billing and significant enhancements in reporting capability that outperforms manual systems and processes. Vendor Dashboard helps OEM to get a quick overview of all ongoing, completed purchase orders as well as top quality and critical vendors of the manufacturing industry and Vendors can view their performance report based on the history of all his previous deliveries. Vendor Dashboard is the place where we can check sales statistics, view recent orders and product changes. The Dashboard also provides information from the database, such as the number of active products and registered customers. This extension of vendor dashboard is used for commercial purposes which overcomes managing multiple-vendors and reduce cost-effectively in terms of time and money.

**Key Words:** Vendor Management System, Machine Learning, Business Intelligence Dashboards, Reporting, Purchase Orders, Top and Critical Vendors.

## 1. INTRODUCTION

Vendor management (VM) has become an integral part of the IT organization. It is becoming more important than ever for clients to consider how they extract maximum value from outsourcing arrangement, particularly in the context of multi-sourcing environments. Outsourcing provides opportunities to leverage external expertise and scale to provide quality services at a reduced cost enabling internal resources to be more focused on activities, appropriate to their knowledge and skill. However, without effective Vendor Relationship Management, organizations are at risk of services not delivering what the business requires and at a premium cost to the business.

Business intelligence dashboards (sometimes referred to as enterprise dashboards) are an analytics tool used to visualize Big Data across all industries. These dashboards provide critical reporting and metrics information and are integral in Business Performance Management. Much like the dashboard in your vehicle, dashboards display real-time key metrics and performance indicators, guiding decisions and

better navigating the surrounding landscape. Dashboards bring speed, but they also bring versatility; view the data the way that suits you best or the way that's best for sharing and storytelling to promote a better understanding of IP performance throughout your organization.

## 1.1 Vendor Management

A vendor management system is an Internet-enabled, often Web-based application that acts as a mechanism for business to manage and procure staffing services – temporary, and, in some cases, permanent placement services – as well as outside contract or contingent labor. Typical features of a Vendor Management System application include order distribution, consolidated billing and significant enhancements in reporting capability that outperforms manual systems and processes.

The vendor management systems are especially helpful in the following cases:

- Managing, creating and sharing reports, which can be a resource-intensive activity requiring a significant amount of upkeep and modification to meet differing – and sometimes competing – requirement.
- Annual reporting of vendor's performance i.e., on the basis of on-time delivery.
- Build and customize a wide variety of charts and graphs including Grouped/Stacked bar, Grouped/Stacked Line, Pie charts.

## 2. LITERATURE SURVEY

Vendor selection literature in procurement management has witnessed a plethora of evaluation criteria, for selecting vendors. This project helps to prepare a list of all the generic vendor selection criteria, which is prevalent in the existing purchasing literature.

### 2.1 Existing System

Vendors often don't communicate changes in processes/technology/services which can impact the manufacturing process (This is happening quite frequently). 1000+ Contracts to manage (Too many to manage). Vendor service levels/performance monitoring – No structured process to make vendors accountable for outcomes. Too many vendors (No categorization of vendors to focus on a few). OEM has tedious work in managing all

purchase orders and multiple vendors at the same time and does not get much time to analyze the ideal vendor.

### 2.2 Proposed System

- This system provides a business intelligence dashboard to the OEM to analyze the vendor data in a fast and easier manner
- The data is visualized graphically to make it easier for OEM to make decisions and manage multiple vendors
- This concept could solve problems involved with predictions and also make the work of OEM much simpler and less time consuming and it could provide a platform and great source to serve people in terms of technology.
- This system mainly focuses on Manufacturing Industry but this general framework can be used for any domain
- This is a "Smart" dashboard which uses Machine Learning for predicting which helps OEM make better decisions to select an ideal vendor and for placing orders

### 3. SYSTEM ARCHITECTURE

Based on the requirements and the survey, we have come up with the system with the Iterative Software Development Process and the architecture of the system is as shown in the figure-1. The architecture is just an overview of the project and can be improvised by each stage as per requirements.

Vendor Dashboard is implemented using the concept of Supervised Machine Learning. Machine learning is a field of artificial intelligence that uses statistical techniques to give computer systems the ability to "learn" from the data.

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Logistic Regression is the appropriate regression analysis to conduct when the dependent variable is dichotomous (binary). Like all regression analyses, the logistic regression is a predictive analysis. Logistic regression is used to describe data and to explain the relationship between one dependent binary variable (i.e. Time in the component On Time Delivery) on and one or more nominal, ordinal, interval or ratio-level independent variables (number of orders delivered).

Within the field of data analytics, machine learning is a method used to devise complex models and algorithms that lend themselves to prediction; in commercial use, this is known as predictive analytics. These analytical models allow OEM to "produce reliable, repeatable decisions and results" and uncover "hidden insights" through learning from historical relationships and trends in the data.

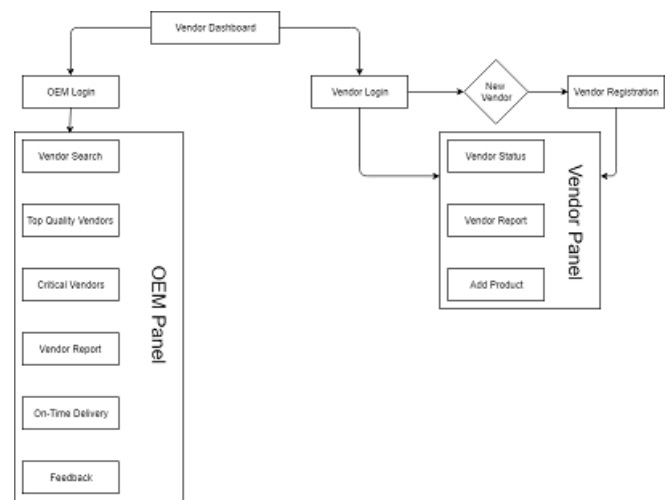


Fig -1: Architecture of Vendor Management System

**Vendor Management:** Vendor management is a discipline that enables organizations to control costs, drive service excellence and mitigate risks to gain increased value from their vendors throughout the deal life cycle.

**Original Equipment Manufacturer:** An original equipment manufacturer (OEM) is a company that produces parts and equipment that may be marketed by another manufacturer.

**Vendor:** A third party that performs a function on your company behalf of provides services, goods to your company or the individual know as a vendor. The vendor can view his report and can add new products.

The privileges of the OEM include

Adding new vendor and Vendor Search

- OEM will be logged in by providing his login credentials.
- The database of vendor will be viewed whenever he clicks on Vendor Search on his panel.
- A vendor is provided by a unique identification code known as vendor code.

Top Quality vendors/ Critical vendors

- Searches top quality vendor based on the previous history of his delivery of the components.
- Machine learning is used to predict the quality of the vendor.
- When there are multiple vendors for a single component it helps to choose Top Quality Vendor which is helpful in increasing production cost.
- If the vendor is in the list of Critical Vendor, it helps OEM to decide to continue the partnership with him or not.

Vendor performance report

Machine learning is used to generate the report based on his previous orders and on time delivery.

#### On-time delivery

- a) The two main factors that influence the OTD window are production line requirements and cash flow.
- b) Customer satisfaction is measured by a "rate of service".
- c) There are 2 RATES OF SERVICE:
  - 1) Rate of orders delivered on time to customer's request (OTD-R On-Time Delivery to Request)
  - 2) Rate of orders delivered on time to a promised date (OTD-C: On-Time Delivery to Commit).

Calculation:

Performance index = ship date-company commitment  
OTD = (number of orders where the performance index <= 0) / (Total number of orders delivered in the week).

#### The privileges of the Vendor include

- a) The Vendor is the actor who interacts with the vendor dashboard.
- b) The Vendor is provided with login credentials.
- c) Once the login credentials are validated, the Vendor can access the Vendor Dashboard.
- d) The Vendor adds the Purchase Order Date and Product Details on the Vendor Dashboard.
- e) Vendor mentions start date and end date of a particular product.
- f) Once the product is finished and ships the product vendor adds the shipped date.

#### 4. CONCLUSION

As the complications for the OEM increases, thus the management of the vendors becomes much challenging day by day as the number of components increases and also the vendors for these components increase too. Hence, the analysis of these vendors depending on the quality delivery is the key to successful management. At last, we would like to conclude that vendor management is a very essential and important aspect or function of any organization. Vendor management helps in the smooth flow of product or service in the market. The organization can rate vendors on different parameters and a select ideal vendor who help to maintain a best or effective vendor management

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