Procurement Timeframe Analysis

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Abstract- **The essential part for a project to be successful is procuring the right material in acceptable timing. Procurement in DRDO may be internal or external. DRDO has established and well-documented procurement procedures. For any procurement case sanction, there are specific steps involved with recommendations, concurrences and approval at various levels. Based on this analysis we would try to find or locate various bottlenecks using algorithms like Apriori that happen during order which hinder theefficiency and create delay in the entire process.We would also work on creating models which would help us to appropriately predict the expected time for the approval process, based on the historical data fed. If we are able to predict it in a proper way, it would behelpful for the project managers to properly manage their timeline and resources.**

Keywords- **Procurement, Aproiri, Predictive Analysis,Bottleneck**

INTRODUCTION

Defense Research and Development Organization(DRDO) is the premier agency under the Department of Defence Research and Development in the Ministry of Defense of the Government of India, charged with the military's research and development, headquartered in Delhi, India. For any project to be successful, the essentialpart is procuring
the right material in acceptable timing. Procurement in DRDO may be internal or external. For external procurement, the organization generally involves outsourcing the requirement to outside vendors.

Outside vendors submit proposals in the form of tenders for the requirement. These proposals are subject to negotiations in order to get the best agreement possible. DRDO has established and well-documented procurement procedures. For anyprocurement case sanction, there are specific steps involved with recommendations, concurrences andapproval at various levels. For procurement and inventory management, DRDO follows a general pipeline. This pipeline typically included the following steps in the following order:

1. Demand
2. Request for Proposal
3.Negotiation
4.SupplyOrder
5.Receiving
6.Payment.

This general pipeline may vary depending on various parameters such as cost, nature of the item, and so on. For example, if an item costs between Rs 5 Crore and Rs 50 Crore, this pipeline would also include several approvals from department Directors. Any procurement process can be broadly divided into 2 parts: i) Order ii) Delivery In our project we would be focussing on the order part of this process where we would analyze the whole process using the data from various DRDO labs regarding their procurement history.

LITERATURE REVIEW

The authors of paper [1] compared the accuracyperformance of six ml algorithms -
Decision Tree, Support Vector Machine, Na¨ıve Bayes, K-Nearest Neighbor, Logistic Regression and Random Forest using 1282 real student's coursegrade dataset, but one of
the main limitations is that the predictions are beingmade based on the past year's academic records which undermines the possibility of severe change of grades in current year.

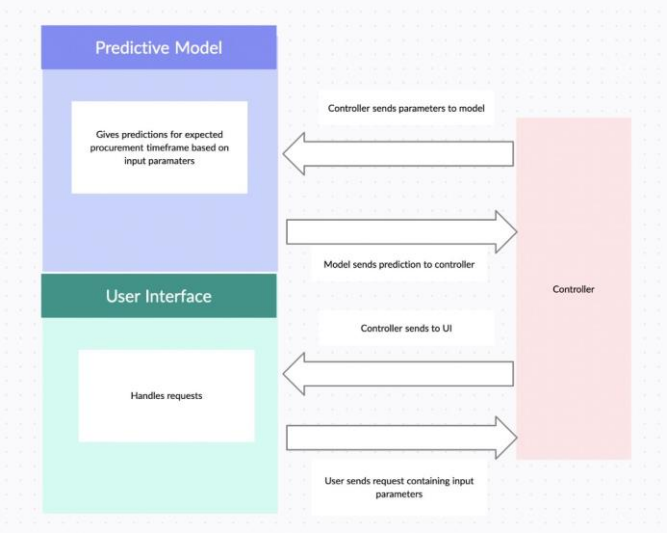
In paper [2] the authors proposed a complex system with many internal and external variables is modelled using system dynamics model to predict the performance of the procurement process but even though it can capture a wide range of changing values in its variables, a system dynamics model can onlyrun one version of a situation at a time.
In paper [3] the supply chain has been represented asa directed graph which describes the relation between its attributes using which bottlenecks are identifiedbut the risk structure for hazard events is not takeninto account, and the overall approach is highly time complex.
In paper [4] authors describe detailed steps for identification of bottlenecks in a production system like Identification of flow sequence, investigation of unit processes, investigation of process cycle timesbut it is a manual process where a flaw in identification in one stage will greatly disrupt the supply chain leading to loss.
In paper [5] management of supply and demand includes distribution. The raw ingredients are delivered by suppliers to producers, who then transform them into finished goods. The same applies to how manufacturers deliver their goods to customers. This issue demonstrates how crucialdistribution is to trade and business, and how anybarriers to it run the risk of impairing the supply chain's functioning, which includes producers as
one of its constituents. The loading and unloadingissues at ports suggest, based on the findings of the interviews, as negative

consequences but More real case scenario should be considered.
In paper [6] The build-to-order (BTO) supply chain is an effective pattern for meeting end-user requirements. However, it is challenging to implementcurrent product control procedures and techniques likeJIT in a BTO supply chain. This paper introduces a new theoretical method for identifying bottlenecks in the BTO supply chain. The strategy is combined with input/output control and the theory of constraints. This method is used to define bottlenecks and explore how they affect production control. Next, an analysis and development of a production control model based on the bottlenecks takes place but more detailed algorithm which consider different parameters to optimize the whole supply chain should be developed eg. Negotiation mechanism with parameters like discount, price etc.

PROPOSED METHODOLOGY

As our project deals with bottleneck detection and time frame prediction so we have planned to use python as our scripting language and google colab as the platform that we would be using to run our scripts.As our project deals with bottleneck detection and time frame prediction so we have planned to use python as our scripting language and google colab as the platform that we would be using to run our scripts.The bottleneck identification portion of the project would carried out using application of Apriori algorithms. For the prediction of timeframe of procurement, models such as Bayesian Belief Networks, Artificial Neural Networks and Random Forest would be considered.
Our Procurement cycle dataset consists of data fromover 20+ DRDO labs across the
country. It includes 48 columns of which we have utilized 8 columns and added 2 extra columns which allow us a better understanding of data.

SYSTEM ARCHITECTURE



The architecture consists of a user interface, controller and thepredictive model.

The user interface is the component the user is going to interact with for using the system. It consists of all the parameters that the user needs to provide as input to the model as well as will display the output i.e. the prediction of timeframe from the model. It forwards the request from the user to the controller. The controller is the binding componentof the system. It is the connecting component between the user interface and the predictive model. It handles therequest of the user from the user interface and forwards, does any kind of processing required, and forwards it to the predictive model for processing.
The output from the predictive model is sent to thecontroller which then forwards it back to the user interface for display.
The predictive model is the core component of the system. It accepts the parameters from the user and provides prediction as output. The prediction is the expected procurement timeframe based on the inputparameters.

CONCLUSION

The web app would be developed which would help the organisation in predicting the time frame for the particular for the procurement process which would be based on majorly contributing parameters. In the procurement cycle it becomes crucial to understand the steps that involved higher complexities which maylead to delay in the procurement cycle.

FUTURE SCOPE

The system can be extended further to many moresystems.
This system can be used for Procurement cycletimeline Prediction.

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