Improved approach of applying data mining in SCM decision making

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***Abstract*— ERP is huge and wide application containing various modules like CRM, SCM, marketing, employee management etc. SCM stands for supply chain management which deals with managing supply of products based on market needs. In supply chain management, organization needs to have a model that can identify them which product should be sent in bulk to a given location and which should not be. If organization sends product in bulk then transportation charge will be reduced but stock keeping charges will increase and vice versa. This location selling rate finder algorithm is about analysing data and generating result that can let organization make appropriate decision about this. Using this algorithm, an organization can fed there data in and can have result displaying selling rate of that product to that given location. This algorithm is mainly use full to business that is having large number of branches and a huge bulky data warehouse.**

***Keywords*—ERP, Association rules, Apriori Algorithm, Data Mining, Algorithm Processing.**

I. Introduction

A. SCM System

Supply chain management is heart of business as it deals with providing constant supply of products to the valuable end users. The system coordinates and interacts with various departments of organization to define strategy of supplying products. Updated supply chain management can help organization keeping clean transportation decisions and keeping stock available always as per the need. It can help integrating information so that organization will always have stock up, never running out or over the stock. By streamlined supply chain management, cost of transportation and stock keeping can be balanced and efforts can be applied on other required needs. Perfectly designed SCM can provide better communication to the internal departments and can allow them generating different reports and statistics.

B. ERP System

ERP system is most popular adoption for any growing business to manage their information is easier and efficient way. It's mainly focused on keeping best track of resources that are being utilised and doing better planning of available resources. A big enterprise can plan their resources in well efficient manner using ERP. To provide best result, EPR is build up of number of modules like CRM, SCM, marketing etc. CRM deals with customer relationship management. This module performs interaction with customers and tries to increase sales leads by providing attractive offers to customers. SCM is supply chain management that mainly deal with efficient flow of supply as per market needs. There are other modules like employee management, marketing, reports etc that can help in another ways.

C. ERP and SCM

ERP stands for enterprise resource planning, which is primary need for business. This helps managing information and keeping them available to all departments together at a time in updated form. SCM is part of ERP and is stands for supply chain management; this interacts with ERP modules to fetch data of market needs. Supply from this department can be decided based on requirements that are coming from marketing department of ERP. Thus communication of this can help streamline the flow of product on supply cycle. Marketing strategies defined, offers decided and based on marketing campaigns arranged SCM will provide supply of products to various locations and departments. Thus these modules are having

tight coupling together and helps utilising resources in efficient way.

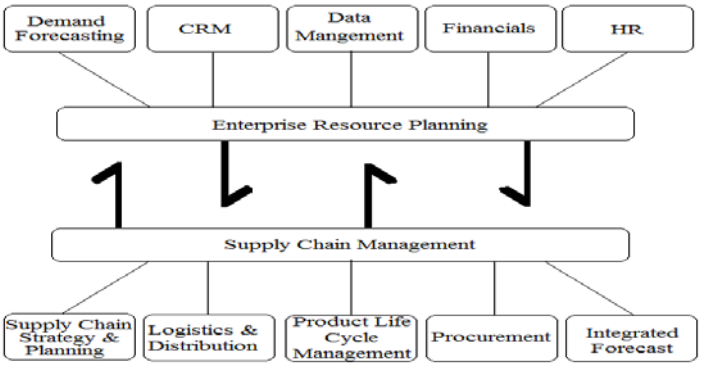

Fig. 1 SCM and ERP

II. Objectives and scope

The objective of this research is finding out a way of analysing customer orders and generating result that can provide efficient supply decisions. This algorithm will generate result that displays location wise report of products and their selling based on product sales orders. The scope of this algorithm lies in each organization that adopts ERP system as their information planning tool and having many branches like super markets.

III. Research Work

A. *Apriori Algorithm*

The Apriory algorithm is most classic and efficient algorithm that generates set of results by analysing transaction sets. It generates candidate sets of products that are available in transaction sets and for those candidate sets then finds support counts. Those support counts are generally occurrences of that candidate set in transactions. The algorithm is efficient and accurate but can be tricky and time consuming for bulk of data to be processed.

B. *Association rules*

Association rules can be seen as if/then statements which can allow associating one action to another for example, if customer has bought milk then can also like to buy bread. This information can be better explained and displayed using association rules. Those rules then can be further applied to analyse data and generate set of clusters.

II. Location Selling rate Finder Algorithm

A. *Algorithm Steps*

1) Get all selling orders
2) Generate set of Locations -> List of products and product counts it will give result of location having maximum number of products sold
3) For each location from the result perform following operations
    1) Get all products and categories products based on selling count like cluster based on selling count
    2) Generate combinations of products in each cluster
    3) Find out occurrence of each combination in sales orders
    4) Repeat all steps until each clusters are not processed and each locations are not processed
4) Merge above result and generate result as table in which place all product combinations in one column and locations as other column headers
5) In each cell of crossing place count and percentage found by above process
6) The result will be location to product combination selling ratio which will help decide selling rate of product based on location

This result will explain marketing department that which location is more active. From result organization can determine requirements of location, on which location which product and product combinations are being sold the most. This will help predict that on particular location need to keep stock of this product more. It will help in trade keeping decision making.

B. *Algorithm Explanation*

To generate result:

1. First we will need to take all sales orders.
2. Then we will need to group product orders based on locations it will generate result as location -> product's list -> product count.
3. Then for each location there we will set of products sold at that location.
4. The next step is generating combinations of products and found out supports for all individual.
5. We already have product's count so based on support and product count we can find out percentage rate of product selling which will help determine supply decisions.

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III. OUTPUT

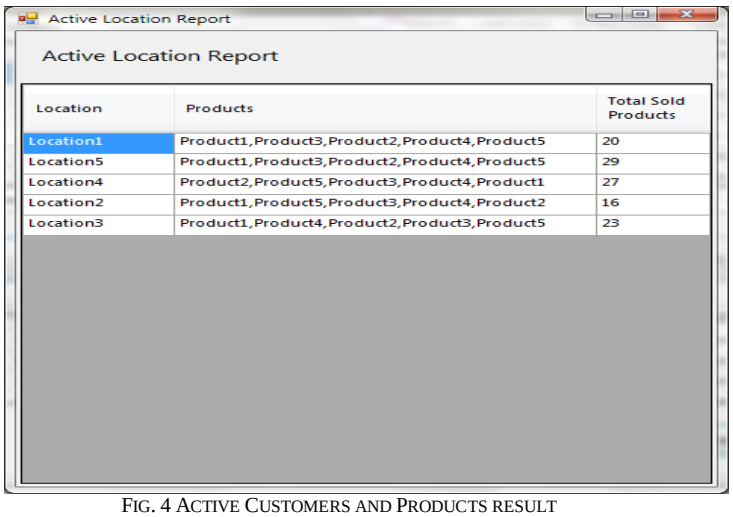
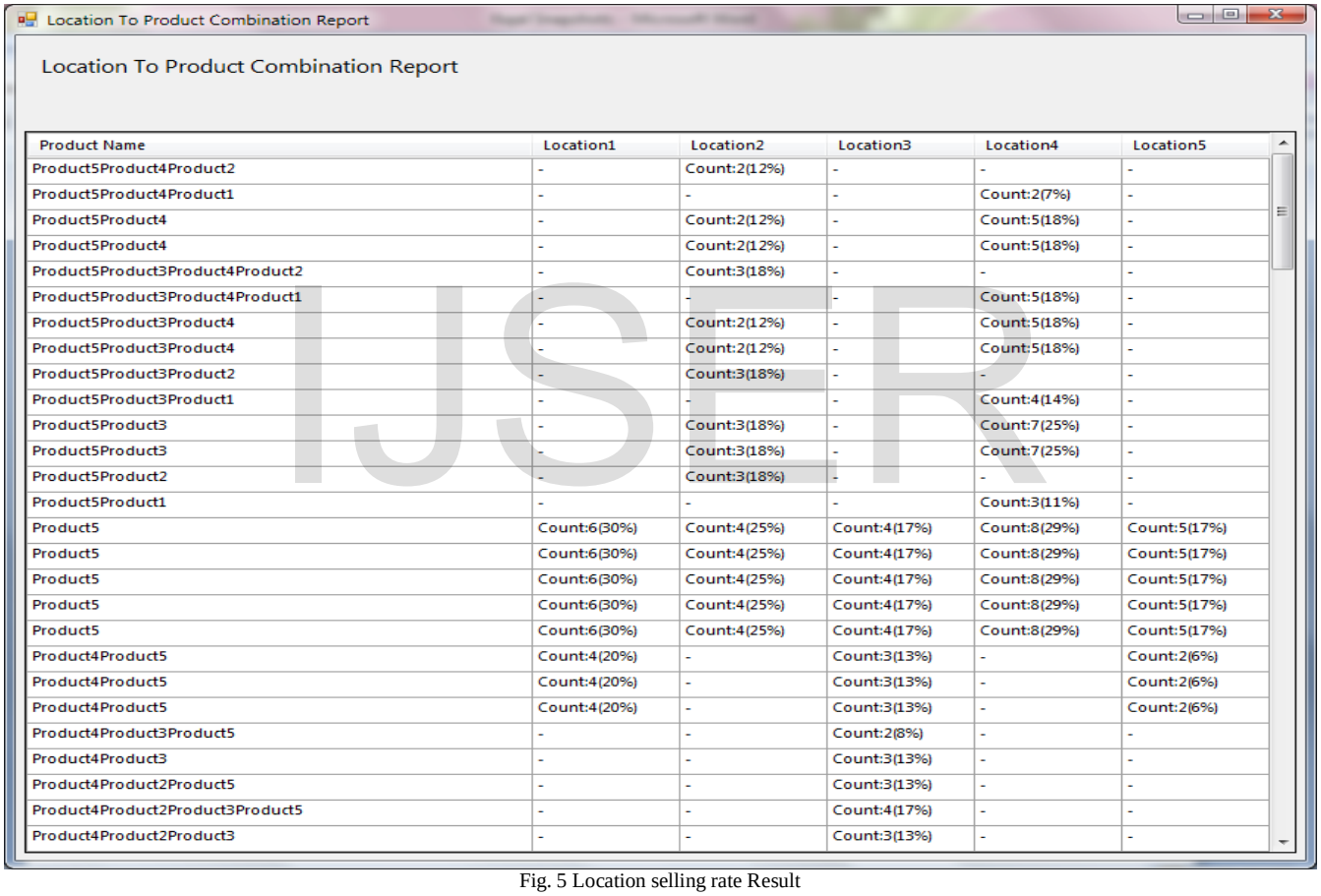


FIG. 4 ACTIVE CUSTOMERS AND PRODUCTS RESULT



Product Name	Location1	Location2	Location3	Location4	Location5
Product5Product4Product2	-	Count:2(12%)	-	-	-
Product5Product4Product1	-	-	-	Count:2(7%)	-
Product5Product4	-	Count:2(12%)	-	Count:5(18%)	-
Product5Product4	-	Count:2(12%)	-	Count:5(18%)	-
Product5Product3Product4Product2	-	Count:3(18%)	-	-	-
Product5Product3Product4Product1	-	-	-	Count:5(18%)	-
Product5Product3Product4	-	Count:2(12%)	-	Count:5(18%)	-
Product5Product3Product4	-	Count:2(12%)	-	Count:5(18%)	-
Product5Product3Product2	-	Count:3(18%)	-	-	-
Product5Product3Product1	-	-	-	Count:4(14%)	-
Product5Product3	-	Count:3(18%)	-	Count:7(25%)	-
Product5Product3	-	Count:3(18%)	-	Count:7(25%)	-
Product5Product2	-	Count:3(18%)	-	-	-
Product5Product1	-	-	-	Count:3(11%)	-
Product5	Count:6(30%)	Count:4(25%)	Count:4(17%)	Count:8(29%)	Count:5(17%)
Product5	Count:6(30%)	Count:4(25%)	Count:4(17%)	Count:8(29%)	Count:5(17%)
Product5	Count:6(30%)	Count:4(25%)	Count:4(17%)	Count:8(29%)	Count:5(17%)
Product5	Count:6(30%)	Count:4(25%)	Count:4(17%)	Count:8(29%)	Count:5(17%)
Product5	Count:6(30%)	Count:4(25%)	Count:4(17%)	Count:8(29%)	Count:5(17%)
Product4Product5	Count:4(20%)	-	Count:3(13%)	-	Count:2(6%)
Product4Product5	Count:4(20%)	-	Count:3(13%)	-	Count:2(6%)
Product4Product5	Count:4(20%)	-	Count:3(13%)	-	Count:2(6%)
Product4Product3Product5	-	-	Count:2(8%)	-	-
Product4Product3	-	-	Count:3(13%)	-	-
Product4Product2Product5	-	-	Count:3(13%)	-	-
Product4Product2Product3Product5	-	-	Count:4(17%)	-	-
Product4Product2Product3	-	-	Count:3(13%)	-	-

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Fig. 5 Location selling rate Result

IV. GRAPHICAL REPRESENTATION OF ALGORITHM RESULT

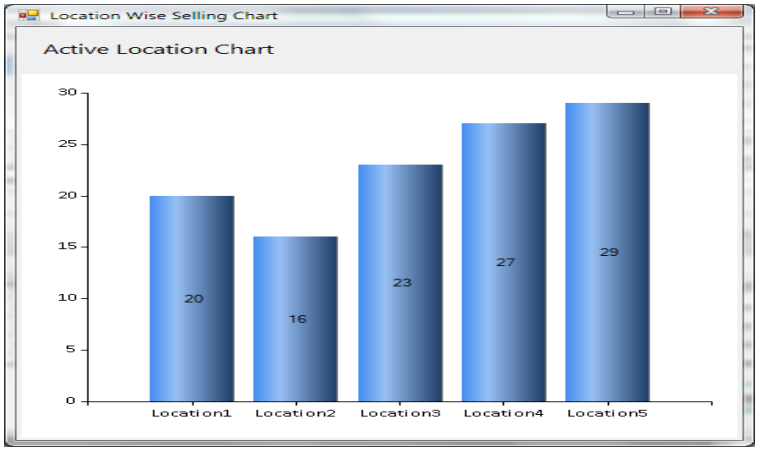

Fig. 6 Active customer graph

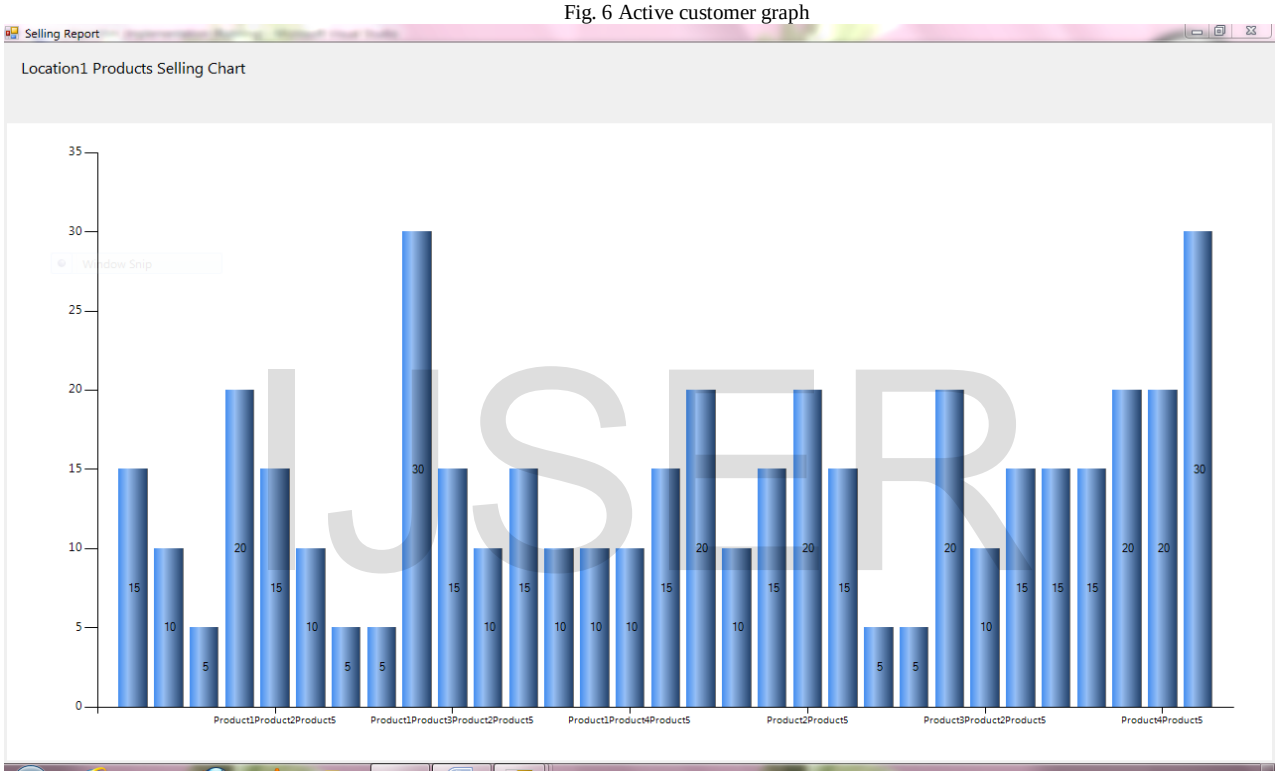

Fig. 7 Location Selling Rate graph

V. Conclusion

This algorithm will provide result that will help organization take decision whether to send goods load or to send stock of product as and when needed. Based on the result of algorithm organization can save cost on transportation and stock keeping and can enhance business.

Future Work

In our algorithm we have considered sales orders and in that we have considered constraints that each product has been ordered in quantity one. We have kept the criteria that product quantity is one but in real-time it could be more, so the part of algorithm that is focused on product occurrence count in sales order can be enhanced for more than one quantity ordered.

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