# Supply Chain Management techniques using big data for Agro food Products in Bangladesh; Logistics Support for Capturing Market by Ensuring Balanced Distribution

Name: Md.Miftahul Alam
Department: *Dept. of Computerscience, FST*
Institution: American International University-Bangladesh (AIUB)
ID: 18-38839-3
E-mail:18-38839-3@student.aiub.edu

Name: MD. ABU SAIF
Department: *Dept. of Computerscience, FST*
Institution: American International University-Bangladesh (AIUB)
ID:19-39993-1
E-mail:19-39993-1@student.aiub.edu

Name: TAMANNA KHAN ARPA
Department: *Dept. of Computer Science, FST*
Institution: American International University-Bangladesh (AIUB)
ID:19-40010-1
E-mail:19-40010-1@student.aiub.edu

***Abstract*—Due to the issues of feeding the world's population sustainably, agri-food supply chains (AFSCs) research has gotten a lot of attention in recent years. Supply chain management (SCM) in the agro-business entails getting agro-products to market on time. Bangladesh's future economic development is heavily reliant on agricultural growth. Agriculture's prosperity is also dependent on ensuring that agricultural products are delivered to the right market at the right time. According to the report, agriculture is the primary source of income for nearly 75% of Bangladesh's rural population. So we will be studying and find ways to develop industrial application frameworks which can harness the power of big data to solve agri-supply chain related problems of Bangladesh, in Bangladesh.**

**(***Abstract***)**

***Keywords—big data, Agri-supply chain, logistics, risk assessment (****key words****)***

## I. Introduction

*Motivation:* Bangladesh economy is agriculture base economy. Most of the people of Bangladesh live in rural are (84%) are occupy with agriculture based activities like cultivation, production and business (SNDP, 2020). Through finding ways to build a framework to make SCM in agri-sector more easier and cost-effective would make this sector more feasible. We will majorly focus on AFSC sections like-logistics planning and risk assessment

*Problem Statement:* Every year 15% agri-products get wasted on roads and through logistic channels. Bangladesh has one of the worst and most expensive logistics in Bangladesh.

*Research Questions:*

1)How to build a framework so that we can collect necessary data?

2)In what specific sectors of agri-supply chain to implement Big data to see results in Bangladesh?

3)What are the major challenges AFSCs in Bangladesh?

*4)*How to predict supply and demand zone-wise and plan logistics earlier using big data technology?

*Outcome:* It will provide a framework and insights built using Big data technology both farmers, agri-business owners and corporations to maximize their profit and help the economy grow. It will make prices of agri-commodity stay in control.

## II. Related Works

A. *Big data for sustainable agri-food supply chains: a review and future research perspectives Abderahman Rejeb1 & Karim Rejeb2 & Suhaiza Zailani*

*Journal of Data, Information and Management*
https://link.springer.com/article/10.1007/s42488-021-00045-3

B. *Ahumada O, Villalobos JR (2009) Application of planning models in the agri-food supply chain: A review. Eur J Oper Res 196:1–20.*

*https:// doi.org/10.1016/j.ejor.2008.02.014*

C. *Gazi, M. A. (2020). Supply Chain Management for Agro Products inBangladesh; Logistics Support for Capturing Market by Ensuring Balanced Distribution.International Journal of Management, Accounting and Economics, 7(6), 277-297.*

D. *Technical Brief on Cocoa Traceability in West and Central Africa.*

E. *Christopher M, Holweg M (2011) Supply Chain 2.0": managing supply chains in the era of turbulence. Int J Phys Distrib Logist Manag 41: 63–82. https://doi.org/10.1108/09600031111101439*

F. *World Bank (2020) Agriculture and Food. World Bank. https://www.worldbank.org/en/topic/agriculture/overview..*

*Accessed 29 July 2020*

G. *Sharma R, Kamble SS, Gunasekaran A (2018) Big GIS analytics framework for agriculture supply chains: A literature review identifying the current trends and future perspectives. Comput Electron Agric 155:103–120.*

*https://doi.org/10.1016/j.compag.2018.10.001*

## III. METHODOLOGY

### A. *Data Collection,Management and Pre-processing*

Figure 1 depicts a functional overview of the proposed system in terms of its primary components in a single glance. It's worth noting that it uses a layered design that's typical of a Big Data system [5], as well as a related stack of technologies, and it's based on [3].

Each data source is correctly wrapped in the data source layer in order to extract the relevant information, which is then represented as required by the data model. Each Wrapper is specialized for a specific type of source (e.g., Sensor Networks, Social Networks, Digital Repositories, Users Data, and Web Data Services) and must address all interoperability issues by providing a set of functionalities to access data sources and gather all desired data, possibly with the help of other Wrappers.

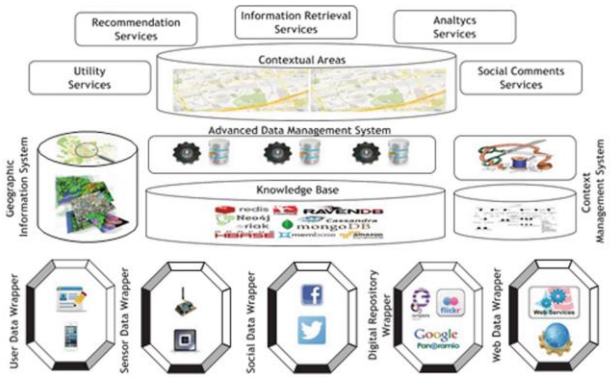


**Fig. 1.** System architecture

The Knowledge Base makes use of a variety of advanced data management technologies (such as Distributed File Systems, NoSQL (non-relational SQL), and relational systems) as well as a set of basic APIs for reading and writing data.

Two further components have been added to the data management layer: a Geographic Information System (GIS) and a Context Management System.

System (CMS). The Geographic Information System (GIS) controls the maps of the environments that are available.
a set of primitives for capturing, storing, manipulating, retrieving, analyzing, and presenting information all types of spatial or geographical data; data customization is done by the CMS. Using context data, it creates a set of geo-referenced Contextual Maps.

• Recommendation Services: to suggest personalized paths to the items and also to help them browse multimedia collections related to a given FI;
• Information Retrieval Services: to search information of interest using content-based facilities;
• Data Analytics Services: to obtain useful statistics about a FI or as support for data-mining and pattern recognition applications;
• Social Comment Services: to post comments and feedback about users' sentiment on social networks;
• Utility Services: for example, to inform users on packaging or information about storing related to a given food item

### B. *Data Analysis and Visualization*

Methods to be used:
(1)Tree Maps
This approach considers a way to visualize hierarchical data as a nested rectangle collection.
A tiling algorithm divides the parent rectangle into sub-rectangles. Typically, a trained approach is utilized. The number assigned to a category is defined by the rectangular region. As a result, the constraint of zero and negative values is limited to tree maps. Furthermore, the hierarchy is distorted due to the presence of extra pixels.

(2) Circle Packing
It's a different kind of tree map that employs circles to represent different hierarchical layers. The number of a type is determined by the circle region. The tree map, for example, uses several colors in distinct groupings.

(3) Parallel Coordinates

This method is a means of showing big data. Data components can be mapped separately through many sizes; both the forest and the tree can be seen in parallel coordinates. Line trends are drawn to collect consistent results. Person lines may be outlined to see the precise output of individual data items. Numerous data objects contribute to overplotting, though. This method is not used for data categorical.

(4) Stream Graph

This method is used to show the displacement of values along a different central timeline. It indicates improvements in data from multiple categories over time. The size of each stream form is equal to each category's values in a stream graph. Ideal for presenting a big dataset. Data visualization tools will quickly gain awareness from a mass of information.

| Tools | Applications | Characteristics |
|---|---|---|
| Tableau | Market intelligence platform for the visual data collection used by scholars and public bodies | Can manage huge amounts of data, filter several data sets concurrently, users can generate and share dynamic and sharingable, dashboards depicting patterns and variants, develop interactive dashboards, built-in R support, Google Big Data Query API. |
| Plotly | online graphing, analysis, and static tools in both Python, R, MATLAB, Perl, J Arduino, and Restate graphics libraries | New open-access agile framework for data analytics and market research. |
| SAS Visual Analytics | Design tool; report, dashboard, and analytical distribution | Full research tool to allow users to recognize trends and relationships in data that are not clear initially |
| Microsoft Power BI | Using natural language questions on a dashboard to create immersive graphics, graphs and dashboards | For business users with their most important measurements in a single place, updated in near real - time, and available on all of their devices, power dash boards include a 360 ° view |
| D3.js | Using SVG, CSS specification, and HTML5 that are commonly applied | JavaScript library for immersive, collaborative web browser visualization |

### C. *Predictive Analytics*

## IV. Conclusion

The Major focus of our study and research will be ways to solve problems and crisis of Agri food supply chain specifically logistics planning and risk assessment using Big data. We will also do detailed study and build a framework to help organizations of Bangladesh collect data, store and create visualization of the analytics produced using Big data technology.

## References


[1] Bosona T, Gebresenbet G (2013) Food traceability as an integral part of logistics management in food and agricultural supply chain. Food Control 33:32–48. https://doi.org/10.1016/j.foodcont.2013.02.004

[2] Weersink A, Fraser E, Pannell D, Duncan E, Rotz SAnalysis (2018) Opportunities and Challenges for Big Data in Agricultural and Environmental10.1146/annurev-resource-100516-053654Weersink A, Fraser E, Pannell D, Duncan E, Rotz S (2018) Opportunities and challenges for big data in agricultural and environmental analysis. AnnuRevResourEcon10:19–37. https://doi.org/10.1146/annurevresource-100516-053654

[3] Croom, S., Romano, P., & Giannakis, M. (2000). Supply chain management: an analyticalframework for critical literature review". European Journal of Purchasing & Supply Management, 6 (1): 67-83.

[4] Ali, S. M., Gupta, N., Nayak, G. K., & Lenka, R. K. (2016). Big data visualization: Tools and challenges. 656–660.

[5] Caldarola, E. G., & Rinaldi, A. M. (2017). Big Data Visualization Tools: A Survey. Research Gate

[6] Ciruela-Lorenzo AM, Del-Aguila-Obra AR, Padilla-Meléndez A, Plaza-Angulo JJ (2020) Digitalization of agri-cooperatives in the smart agriculture context. Proposal of a digital diagnosis tool. Sustain Switz 12. https://doi.org/10.3390/su12041325

[7] Coble KH, Mishra AK, Ferrell S, Griffin T (2018) Big data in agriculture: A challenge for the future. Appl Econ Perspect Policy 40:79–96. https://doi.org/10.1093/aepp/ppx056