Market Risk Sensitivity Data Consolidation Tool for Investment Banks

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Abstract - *In the financial domain, risk management encompasses the processes of identifying, analyzing and mitigating of uncertainty that comes with every investment. Risk management happens when one analyzes the context and tries quantifying the potential losses in an investment, and then undertakes the required action with the objective of the investment and the maximum bearable risk amount in mind. This paper discusses an integrated risk consolidator, which consists of measures and dimensions. Measures are the factual values, whereas dimensions are the describing aspects of those measures. This results in a data unit that holds the risk sensitivities of various different investment banking processes, and can be easily accessed by decision making authorities.*

Key Words: **Risk management, Sensitivities, Investment Banking, Risk Consolidator, Data Warehousing, Decision Making**

1. INTRODUCTION

Investment risk can be stated as the amount of variation of the actual outcome from the hypothesized outcome. A parameter of measure of risk called Value at Risk (VAR) is highlighted as well as importance of stress testing is mentioned, the results of both of which are of key importance from the bank's perspective. It is mentioned that Value at Risk is used to calculate the highest possible loss that can be expected in an investment, over a certain period of time and provided a specified level of confidence [1]. With the use of fuzzy integral support vector machine (SVM) model higher classification accuracy is achieved, thereby providing a theoretical basis for the bank to establish more reliable evaluation system [2]. A clear and contextual definition of risk management was provided as follows. The aim of risk management is not to avoid carrying out risk-laden activities entirely, but, on the contrary, to ensure that when the risk-laden activities must be carried out, they are carried out with full knowledge, discernible purpose and a deep level of understanding so that the risks involved can be clearly measured, understood, and thereby mitigated [3]. An investment banking risk management system that is majorly based on a Hadoop system with Extraction-Transform-Loading (ETL) as well as processing engines based on Spark, and databases that were equipped with Massive Parallel Processing (MPP) capabilities were all used. The result of this was that there was a clear and a significant performance improvement in risk management [4]. Security risk management of online investment banking and its effects were studied. It is discerned that online banking can be a point of concern for serious security related incidents. A

large part of malicious attacks were sourced from a particular vulnerability that was not given enough attention, and was handled poorly and without necessary strategies, thus highlighting the importance of risk management [5].

2.0 METHODOLOGY ADOPTED

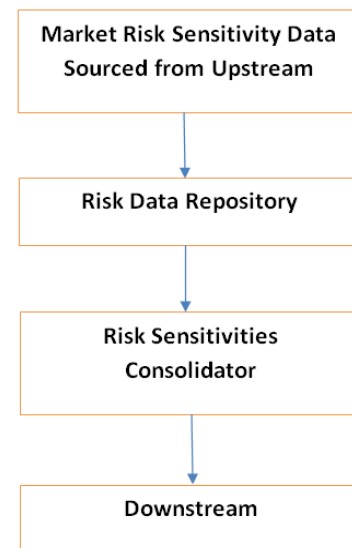The adopted methodology for the proposed work is as shown below in Fig-1.

Fig -1: Block Diagram of Risk Management in middle office

2.1 METHODOLOGICAL DETAILS

Upstream Risk Sensitivity sources have the responsibility of observing market trends of each day, tabulating the risk data on pertaining trades and deals, and forwarding this data to the risk sensitivity storage repositories.

Risk data and sensitivities on the various transactions, trades and deals pertaining to the respective portfolio are received from upstream sources. These are then stored in the large risk repositories that are used for this sole purpose. This repository is merely a storage unit that in itself is not organized or structured enough for usage downstream.

The unorganized and partly structured data from the risk repository is cleaned up, enhanced and molded into a structured and clear format that is then stored in the risk consolidator. Once risk sensitivities have been stored, it becomes easier to access and view this structured data. The downstream consists of teams and the other intra-

organization units that are responsible for decision making and planning.

Gathering, integrating, analyzing and managing of data from various heterogeneous sources in order to gain meaningful business insights and develop a clearer understanding of the contextual situation is what is called as Data Warehousing. Business intelligence units have these data warehouses as their central parts that are then used for analysis of the data, and reporting based on these analyses. With the coupling of appropriate components and relevant technologies, a data warehouse can become a strategic tool in data management. Virtual storage of massive quantities of data carried out by an organization that is designed for query based analysis. The essence is to transform data into a meaningful form so that it is available for easy analysis as and when needed. It can also be seen as a support database for decision making processes. However, it is wise to understand that data warehouses should not be misunderstood as being a product. On the contrary, they can be seen as a prototype information system which provides users with relevant current and historical decision support information, which cannot be easily accessed and presented otherwise.

SQL Server Integration Services (SSIS) are used to carry out a wide variety of data integration and data transformation tasks. Simply put, it gathers data from multiple heterogeneous sources, and integrates them so that this data can be further processed and analyzed. It is also used for maintenance automation in SQL server databases, at the same time carrying out updates to the multidimensional data. However, its prime task is undertaking the process of ETL. It extracts the data from various sources, transforms this data to meet desired requirements, and then loads this enriched data into a target data warehouse.

SQL Server Analysis service (SSAS) essentially creates an Online Analytical Processing database. It offers analysis service using various dimensions. Along with being a multi-faceted OLAP server, it is also an analytics engine which can be used for fragmenting and taking useful chunks out of massive amounts of data. SSAS cubes receive aggregated data from data warehouses. Analysis cubes are formed, and can be used for various purposes as soon as the analysis database is setup.

SQL Server Reporting Services (SSRS) is the reporting tool that comes last in the sequence of events, after SSIS and SSAS respectively. Its role is the creation of formatted reports that hold the processed information, which can be in the form of charts, tables, graphs and images. A server that can be easily accessed by authorized users is employed to host and maintain these reports. Since it cuts out the need for there to be IT experts for interacting with it for data access, users are able to procure the information without any issues. By being easy to work with and handle, SSRS not only makes it easier on the users, but also enables improved and precise decision making. With the aid of the World Wide Web, reports can also be accessed over the internet, thus improving accessibility.

2.2 IMPLEMENTED SYSTEM

The block diagrams in Fig.2 and Fig.3 show the final implementation and result of risk management tool.
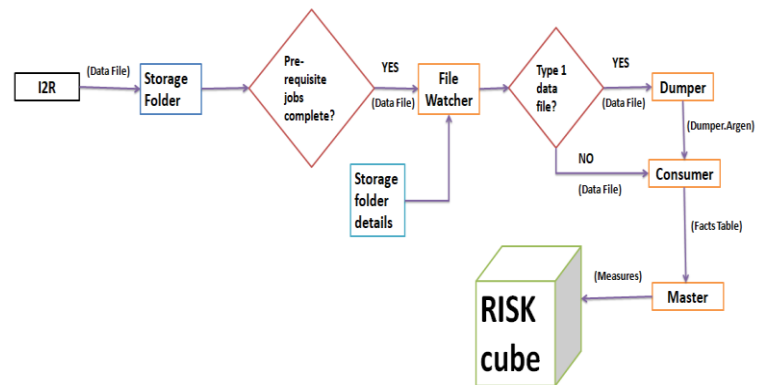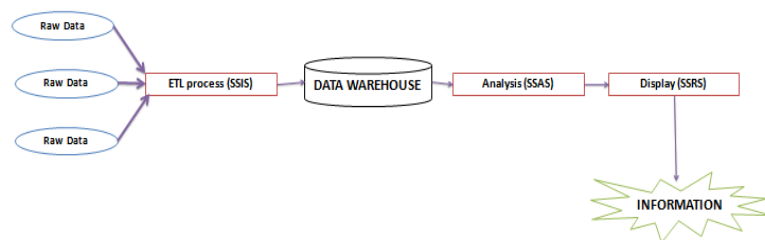

Fig -2: Block Diagram of implemented system

Fig -3: Working of various services to create risk sensitivity information

3. CONCLUSION

Implementation of above block diagrams results in a real-time, accurate and simple to use market risk sensitivity consolidator tool. Risk sensitivities for various different transactions, portfolios, and environments, group of portfolios, instruments and dates are aggregated into a single unit that is easily accessible and usable. Equipped with a deeper knowledge of the risks involved, downstream decision making units are better suited to make informed decisions that are efficient and effective. Clients are also served better once risks are calculated and mitigated.

Risks are ubiquitous in every domain, especially so in the investment banking sector, which makes risk management of paramount importance. Therefore, this project is an excellent means by which one can get acquainted with how risk management processes function in a globally present

investment banking group. By mitigating risks involved in the various front office processes of our organization, we can help to better serve clients, as well as create a wider understanding of the vast finance sector.

Non-complex real-world financial models are majorly employed for creating a profound understanding of the market. These models are helpful to observe and understand key market parameters that decide prices and sensitivities. This is how they furnish critical information that is necessary to manage investment risk. The amount by which a financial instrument is affected by altercations in various market parameters is what is known as its sensitivity to risks. Bonds, stocks and other instruments are all influenced by these parameters, and the aim is to learn how and in what amounts they are changed by these parameters.

By creating and maintaining a real-time, accurate and easy to use risk sensitivity consolidation unit, informed decision making can be carried out by the downstream managerial units that can then help to better serve clients, and make key processes far more efficient and effective.

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