

Shipment Data Dashboard using Power BI

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Abstract: Nowadays, with the change in business circumstances, the significance of Business Intelligence has gained lots of consideration. Business Intelligence tools can provide standardization with a fast and smart decision-making process based on multiple data sources, which might be able to affect the survival of the organization in the market. And because of the changes in the extrinsic business environment and professional needs, a new access BI solution, a Self-service BI solution, is introduced and during the last few years, the number of market players using the approach has increased expeditiously. The objective of this paper was to build a BI dashboard solution to the Business Problem: Power BI presented by Microsoft, one of the leading professionals in the area of MSBI. This research contains two parts. The first part is the theory package which covers the Microsoft Power BI Tool and BI Dashboard-making approaches in order to provide the readers with an overall understanding of these concepts. The second part contains the understanding of the structure of the data and restructures the data in such a way that the data model could fetch useful information from the restructured data.

Keywords: Auto-Scheduling; analytics; exploring; Integration; impactful; Intelligence; Visualization

I. INTRODUCTION

The Power BI dashboard would typically include visuals such as maps showing the location of shipments, charts displaying delivery times, and tables showing shipment details. Users could interact with the dashboard by filtering data based on specific criteria, such as shipment origin or destination, carrier, or delivery date.[1]

The dashboard could also incorporate data from multiple sources, such as ERP systems, logistics providers, and external data sources. This would allow users to gain a comprehensive view of shipment operations and make data-driven decisions to optimize their processes.

Power BI is a data visualization and business intelligence tool that we will use for making an interactive dashboard and reports for end user. A shipment dashboard in Power BI would provide insights into various aspects of shipment operations, such as tracking, delivery times, and costs.

Today, BI continues to evolve and Microsoft is leading the way by bringing a new generation of BI to organizations, with solutions that will extend and build on, rather than replace, existing analytics platforms and tools. With Power BI, a business analytics service for visualizing and analyzing all of your data in one place, Microsoft's goal is to bring business intelligence to everyone.

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II. LITERATURE REVIEW

Business Intelligence

Business intelligence (BI) is described as "the set of techniques and tools for the renewal of meaningless (raw) data into meaningful and meaningful information for business analysis purposes". The phrase "data surfacing" is also more often correlated with BI functionality. BI technologies are capable of managing large amounts of unorganized data to help identify, promote and otherwise create new crucial business opportunities.[2] The goal of BI is to allow for the easy perceptions of these large volumes of data.

History

The term "Business Intelligence" was originally composed by Richard Millar Devens in the Cyclopædia of Commercial and Business Anecdotes' from 1865. In a 1958 article, IBM researcher Hans Peter Luhn used the term business intelligence. He worked the Webster's dictionary definition of intelligence: "the ability to apprehend the interrelationships of presented facts in such a way as to guide action on the way to a desired goal.

Business intelligence as it is understood today is said to have evolved from the decision support systems (DSS) that began in the 1960s and developed during the whole of the mid-1980s. DSS originated in the computer-aided models created to assist with decision making and planning

In 1988, an Italian-Dutch-French-English monopoly organized an international meeting on the Multiway Data Analysis in Rome. The eventual goal is to reduce the multiple dimensions down to one or two (by detecting the patterns within the data) that can then be presented to human decision-makers.

In 1989, Howard Dresner (later a Gartner Group analyst) proposed "business intelligence" as an umbrella term to describe "concepts and methods to improve business decision making by using fact-based support systems." It was not until the late 1990s that this usage was extensive.

Self-service Business Intelligence

Distinguished with Business Intelligence, Self-service Business Intelligence is a new-born BI motif. Self-service business intelligence (SSBI) is a way to data analytics that facilitate business users to access and work with allied data even though they do not have a background in mathematical analysis, business intelligence (BI) or data mining.[3] Allowing end users to make decisions based on their own queries and analyses frees up the organization's business intelligence and information technology (IT) teams from creating the plurality of reports and allows those teams to focus on other tasks that will help the management reach its goals.

Definition of Self-service Business Intelligence

The interpretation of Self-service Business Intelligence was projected by Claudia Imhoff and Colin White. The ease within the BI environment that enable BI users to become more self-reliant and less reliant on the IT organization. These ease focus on four main objectives: easier approach to source data for reporting and analysis, easier and improved support for data analysis features, faster deployment options such as appliances and cloud computing, and

simpler, customizable, and cooperative end-user interfaces.

Self-service BI vs Traditional BI

Self-service BI has lots of advantages that traditional BI does not have, Self-service BI is not a replacement of traditional BI solution. In fact, Self-service BI and traditional BI support each other in many areas. In addition, the target users for these two types of BI solution are distinctive. Self-service BI focuses on business users who have slight experience with IT or related information while traditional BI has both business users and IT professionals involved in the solutions.

Self-service BI accentuate on providing an easier tool to use with less IT involvement and usually it is a pre-defined package. The Self-service BI let business users have the direct access to data source, which facilitate a better and faster access than conventional way. In addition, Self-service BI allows end users to create personalized reports and analyses. IT professionals are no longer one of the key users in Self-service BI, IT becomes an auxiliary role. On the other hand, traditional BI is carried out according to the organization’s own needs consistently managed by IT professionals or a BI center.

In traditional BI, IT division is not only a supportive role to help business users to understand what kind of data is feasible, but also one of the key roles in all tasks related to data from eliciting to loading. It is very hard to say which one is the better option for an organization.[4] If the organization has more advanced and customized business needs, traditional BI is still the primary option. If the organization is looking for a more self-reliant and less IT-dependency solution, then Self-service BI will be a better option. It is also possible for an organization to have both solutions working at the same time. In this case, the organization really has to target on how to balance both solutions.

Microsoft Self-service BI

Power Pivot is Microsoft’s first stride in Self-service BI field. Within these years’ growth, Microsoft now gives Power BI for Office 365 and Self-service BI features in Excel. In this chapter, Power BI and its related features will be given. To create multileveled equations, it may be essential to treat the equation as a graphic and put it into the text after your paper is styled.

Number equations successively. Equation numbers, within parentheses, are to position flush right, as in (1), using a right tab stop. To make your equations more condensed, you may use the solidus (/), the exp function, or suitable exponents. Italicize Roman symbols for quantities and variables, but not Greek symbols.[5]

Overview of Power BI

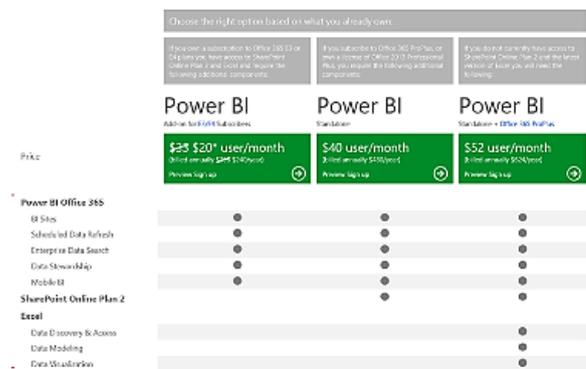
Power BI is Microsoft’s most recent Self-service BI offering. Microsoft Power BI solution gives business user oriented data analysis and visualization capabilities to upgrade decision-making process and the business visions. Power BI is a cloud-based Self-service BI solution, which means you can build and deploy solution immediately with data from cloud and on-premises data sources, systems and function. All these are introduced in Microsoft’s trust enterprise cloud.

Power BI consists of three main features and services. The first feature is the Self-service BI features in Excel. There are four features: Power Query, Power Pivot, Power View and Power Map; all these features are used to give data analysis efficiencies for business users. The second feature is Power BI for Office 365, which proposes the platform where users can share reports, datasets even queries online and embellish the ability to access data and reports. And you can even find answer to your queries with the most recent Q&A features in Power BI for Office 365. The third feature is the IT infrastructure for Power BI, which builds a simple way for

administration and data management between on- premises and in cloud data.[6]

Mostly, every Excel consumer can be the point of Power BI if they have a need for Self-service BI capabilities. Microsoft defines the target users of Power BI into three categories: report creators such as the data analysts or consultants, data steward such as data scientists, administrators or IT professionals and report customers. Report creators will advantage from the analytical capabilities, sharing and searching features. The data steward can use Power BI to manage data connection and structure. IT professionals act as management to ensure Power BI working properly and control the security issues. Power BI provides a trustworthy platform to share reports and analyses for a better decision, which build up the association inside the organization. And every-one can be a report user by using Power BI.

License and Cost



Feature	Power BI (Active Subscriptions)	Power BI (Per User)	Power BI (Per User - Office 365)
Self-Service BI	Yes	Yes	Yes
Enterprise Data Search	Yes	Yes	Yes
Mobile BI	Yes	Yes	Yes
SharePoint Online Plan 2	Yes	Yes	Yes
Data Discovery & Access	Yes	Yes	Yes
Data Modeling	Yes	Yes	Yes
Data Visualization	Yes	Yes	Yes

Features and Services

The Power BI service, or powerbi.com, offers a simple, intuitive experience for interacting with data. From creating and sharing dashboards to exploring and enhancing reports, Power BI makes it easy to engage with data from heterogeneous sources, fueling faster, more insightful business decisions. With Power BI, you get a rich, consolidated view of key information, no matter where all of the underlying data is stored.

Live dashboards

A Microsoft Power BI dashboard is a set of data visualizations, or charts, from one or more underlying reports, presented in an engaging way that makes it easy to glean insights - no analytics expertise needed. An advantage of Power BI is that dashboards are live. For example, when a visualization in a dashboard is connected to a real-time data source, the visualization updates continuously, enabling faster insights.

A dashboard may contain visualizations from multiple reports. Dashboards are highly customizable - you may add, or “pin”, any chart from any report to any dashboard.

Interactive reports

With a user-friendly interface, Power BI enables anyone to create rich, interactive reports. A report is a set of charts, also known as visualizations, based on the same underlying dataset*. [7] You may construct a report from scratch, select a pre-authored report (such as a report generated in Power BI Desktop), or apply a default report for a given dataset. Reports can be customized - for example, by modifying visualizations in an existing report, or adding new visualizations.

III. METHOD PROPOSED

- **Identify the key performance indicators (KPIs):** Start by identifying the KPIs that are most important to stakeholders. These may include metrics such as on-time delivery, transit time, cost per shipment, and customer satisfaction.
- **Determine data sources:** Identify the data sources needed to track the KPIs. This may involve integrating data from multiple systems such as the transportation management system (TMS), warehouse management system (WMS), and customer relationship management (CRM) system.
- **Design the dashboard:** Using the identified KPIs and data sources, design the dashboard layout and visualizations.[9] Consider the target audience and their specific needs, and create a user-friendly interface that displays the data in an intuitive manner.
- **Develop the dashboard:** Using the selected tools, develop the dashboard according to the design. This may involve using a variety of technologies, such as data visualization tools, programming languages, and cloud-based services.
- **Test the dashboard:** Once the dashboard has been developed, conduct testing with stakeholders to ensure that it meets their needs and addresses their pain points. This may involve conducting usability testing, and gathering feedback on the usability, performance, and accuracy of the dashboard.
- **Deploy the dashboard:** Once the dashboard has been tested and refined, deploy it to the target audience. This may involve integrating it with existing systems and training users on how to use it effectively.
- **Monitor and evaluate:** Continuously monitor the performance of the dashboard and evaluate its effectiveness in meeting the identified KPIs. This may involve gathering feedback from users and making ongoing improvements to the dashboard.
- **Maintain and update:** Maintain and update the dashboard over time to ensure that it remains relevant and effective. This may involve integrating new data sources, adding new features, and addressing any issues or bugs that arise.[8]

The primary focus of this research is to restructuring the data before designing the dashboard step mentioned above because in most of the cases the actual key data column is missing and the data is given in transpose or pivoted table manner. In such cases even complicated Joins and Subqueries are seems to be fail in fetching the data.

The solution to such problem will be discussed in next section called "Evaluation and System analysis".

IV. EVALUATION AND SYSTEM ANALYSIS

As discussed in the previous section that in most of the cases the

actual key data column is missing and the data is given in transpose or pivoted table manner.

So, for solving this issue Power Query Editor plays a vital role on such situation as you can see on figure-1 that the numerical values given in the table are the Rates against each weight for different Zones but here the only problem is that when query is tries to fetch the data as there is not column with Rates only for each weight with different Zones.

	Zone P	Zone Q	Zone R	Zone S
Int'l Economy				
FedEx Box 0.5 kg	63.33	63.47	63.57	73.25
1.0 Kg	73.78	73.95	75.44	82.91
1.5 Kg	84.51	84.60	87.18	92.43
2.0 Kg	93.85	93.94	96.78	102.08
2.5 Kg	103.20	103.30	106.40	111.73
3.0 Kg	111.09	111.20	114.25	121.18
3.5 Kg	118.98	119.09	122.11	130.63
4.0 Kg	126.86	126.99	129.96	140.06
4.5 Kg	134.75	134.89	137.81	149.50
5.0 Kg	142.64	142.79	145.67	158.95

Figure- 1

The solution to above problem is restructure the data set in such a way that there will be a column with Rates only for each weight with different Zones shown in Figure-2.

Weight	Attribute	Value
0.5	Zone A	37.58
0.5	Zone B	41.26
0.5	Zone C	46.45
0.5	Zone D	55.94
0.5	Zone E	57.45
0.5	Zone F	64.15
1	Zone A	40.86
1	Zone B	45.78
1	Zone C	52.03
1	Zone D	62.03
1	Zone E	63.92
1	Zone F	72.68
1.5	Zone A	44.16
1.5	Zone B	50.3
1.5	Zone C	57.61
1.5	Zone D	68.11
1.5	Zone E	70.4

Figure-2

Such solution can be achieved by first dynamically insert the data into the power Query Editor by making the use of 'Invoke custom function' and then 'Unpivot' selected column i.e., columns other the weight column.

V. FUTURE SCOPE

While creating a Dashboard it becomes difficult to fetch the data from the large dataset which is already not present in the data structure with values as the column names in such a cases Power BI developer can make use of the approach in future will handling such problem of fetching data before making the actual end-user dashboard.

So, first approach to handle such data-set will be to restructured the data in such a way that information fetching through SQL query or

any another query language (for Example, DAX query language used in Power BI) becomes easy and efficient. Power BI Developer can use 'Invoke custom function' and then 'Unpivot' selected column i.e., columns other the weight column.

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