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Business Intelligence Analysis and Design to Improve Revenue Performance at Holding Companies

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Abstract

COVID-19 Virus Disease 2019 (COVID-19) is rapidly spreading around the world, so the world economy is hit by a major crisis. Government policies for restrictions on activities make the company experience a significant decrease in revenue, especially for companies in the field of property and hotels, so the need for information on the entire business process of the company becomes one of the important needs for the survival of the company. Business Intelligence (BI) is one of the solutions for companies' needs, especially in analyzing and providing access to data to help make better decisions. Companies need dashboards to process data into information, so that decision-making can be used to support business processes that are running in the midst of a pandemic. Therefore, a Business Intelligence dashboard is needed to analyze revenue data that can be used to improve the performance of each branch in the company. The stages of making a BI dashboard are literature study, justification, planning, business analysis, design, construction, and report. The results of this study are visualizations in the form of graphs of PT JSI Tbk's revenue, Company revenue, Branch revenue, and Branch revenue in 2021. Based on the results of the prototype of the BNV, PM, and HCR branches must be creative in improving performance or operational cost efficiency.

Keywords
COVID-19 Virus 19; business intelligence; dashboard

I. Introduction

Corona Virus Disease 2019 (COVID-19) was initially detected in November 2019 in China's, specifically in the province of Wuhan. Following that, the virus rapidly spread around the world, causing a huge economic crisis. Globally, the virus has infected 124,793,058 people. The data is derived from nytimes.com websites that track the global spread of COVID-19 in real time as of March 25, 2021. Since March 11, 2020, the World Health Organization (WHO) has declared the Covid-19 outbreak a global pandemic. After all, given its status as a global pandemic, this also impacts Indonesia. The number of COVID-19 cases in Indonesia reached 1,476,452 as of March 25, 2021, according to statistics from covid19.go.id, which tracks the global spread of COVID-19 in real time as of March 25, 2021. Coronavirus or in the Indonesian term referred to as Corona Virus is a collection of viruses from the subfamilli Orthocoronavirinae in the Coronaviridae family and the order of Nidovirales. This group of viruses basically can cause disease in birds, including human mammals (id.wikipedia.org). In humans, this virus can cause respiratory infections from mild in nature such as colds to those of a severe and deadly nature such as SARS and MERS. Coronavirus is currently developing and experiencing changes in variation which is then referred to as Covid-19 (Corona Virus Disease in 2019). (Nazar, M. et al. 2020). The world health agency (WHO) has also announced that the corona virus, also called COVID-19, is a global threat worldwide. The outbreak of this virus has an

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impact especially on the economy of a nation and globally. These unforeseen circumstances automatically revised a scenario that was arranged in predicting an increase in the global economy. (Ningrum, P. et al. 2020)

In response, President of the Republic of Indonesia, Joko Widodo, urged to all communities on March 15, 2020, during a Press Conference in Bogor, to work, take classes, and worship from home in order to avoid the spread of COVID-19. Various nations then began implementing the COVID-19 Protocol in accordance with the World Health Organization's (WHO) recommendations, which included hand washing, keeping away from gathering / meeting, maintaining distance, limiting time spent outside the house, and even self-isolation of individuals, communities, and even entire cities (ranging from Large-Scale Social Restrictions/PSBB to the enactment of Lock Down) (Sugianti & Anwar, 2021). As a consequence, many companies, both governmental and public, employ a work-from-home policy (WFH).

Government policies restricting activities result in a considerable drop in revenue, making the requirement for knowledge about the entire company's business processes critical for the company's existence (Siregar, 2021). In comparison to report list data, which requires analysis by professionals from the company's management side and takes a long time to complete, visualization makes it easier for businesses or parties determined to interpret visual data. Business intelligence (BI) is a technique for resolving a business's problems and requirements. Businesses utilize business intelligence to process and manage data and information in order to aid in strategic decision making (Appelbaum et al., 2017; Nyanga et al., 2019). In conclusion, BI is information derived from the results of data analysis conducted on an organization's actions. BI is a technique for enhancing a business's competitive advantage by utilizing diverse data, information, and knowledge assets possessed by the business as a source of information during the decision-making process.

Various investigations on Business Intelligence have been undertaken, including one by Rezkiani et al. (2017) entitled "Implementation of the Concept of Business Intelligence in Public Training Marketing Strategies at PT Zigot Mediatama." The research results in marketing techniques that make use of readily available data, such as trainee lead information. Likewise, Alviana & Kurniawan (2019) published a paper titled "Analysis of New Student Admission Data to Increase University Marketing Potential Through Business Intelligence (XYZ University Case Study)". The research presents the findings from the application of new student admission data via information systems. The information system exhibited includes a system login page, the main Dashboard page, and a new student admission information page organized by the student's birthplace, home province, major of interest, as well as faculty in high demand by incoming freshmen.

In order to create a Business Intelligence report, Microsoft Power BI is one of the programs that may be used to create a dashboard. Microsoft Power BI was chosen for this study because it offers various benefits, including interactive graphic customization, over 30 chart visualization tools, and manage connection features that automatically find linkages between data. Furthermore, Microsoft Power BI features a query editor capability that can examine millions of data points from a variety of sources. As a result, the creation of Dashboard-based Business Intelligence is intended to assist executives in understanding the state of the company's business operations throughout the current crisis, as well as serve as a reference in decision-making and service enhancement.

In this study, a Holding Company which is PT JSI Tbk involved in the real estate and hotel sectors being investigated. In addition to having a corporate headquarters and three subsidiaries, the company has seven branches that create huge amounts of data each day.

One of the data sets generated is revenue data from each branch; thus far, revenue data has been read using Excel reports, which means that it takes time to obtain information on revenue movements at each branch of the company during the year. The data cannot be processed directly, but must be done pre-processing, namely data cleaning to eliminate data duplication, check for data inconsistencies, and correct other data errors to produce information that is easy to understand. The company needs a dashboard to process data into information, so that decision-making can be used to support ongoing business processes. Therefore, an application is needed that can generate a Business Intelligence Dashboard to analyze revenue data that can be used to improve the performance of each branch in the company.

In light of this background, the main purpose of this study is to analyze and create a Prototype Dashboard Business Intelligence on revenue data for Operating Holding Company companies in the field of real estate and hotels. The data displayed is in the form of a Dashboard that is expected to help the company in making decisions to assess the performance of each branch.

II. Review of Literature

2.1 Business Intelligence

As a framework to support business decisions from the findings of analysis conducted after looking at current data, Business Intelligence design is a collection of databases or Data Warehouses, analysis devices, and applications or systems that work together to support business decisions (Turban, 2007). Business intelligence (BI) is a concept that describes to programs and technologies that collect, store, analyze, and provide access to data in order to assist corporations or organizations in making better and more appropriate decisions (Brannon, 2010).

In other words, business intelligence is a combination of data warehouse and data mining. This explains how data can be taken and saved from a variety of sources and then accessed for analysis. The primary functions of Business Intelligence include data collection, preparation, and analysis (Saputra, 2021). The data utilized in the Business Intelligence process must be of high quality; this is accomplished by collecting data from multiple data sources, altering it, cleaning it, and thereafter loading and storing it in the Data Warehouse database.

2.2 Business Intelligence Architecture

A business intelligence architecture is composed of six major components (Orsenigo & Vercellis, 2009), namely the Data Source, the Data Warehouse, the Data Exploration, the Data Mining, the Data Presentation, and the Decision.

2.3 Business Intelligence Architecture

The Data Warehouse (DW) is a collection of relational databases that are typically used to evaluate requirements rather than transaction processes. It typically contains data from the transaction process as well as data from other sources. Additionally, a data warehouse can be defined as a summary store for historical data that is frequently extracted from the databases of individual departments, organizations, or businesses (Kimball & Caserta, 2004).

Data Warehouse is a collection of data that has a subject-oriented, integrated, time-variant, and fixed nature of the data collection in support of the management decision-

making process, this process is subject-oriented, integrated, time varied and permanent (Inmon, 2002). Data Warehouse is a collection of virgins from various data sources into one storage area, which aims to make it easier for users to explore data to generate hassles and perform analysis. With it DW is very helpful for users in making decisions, because DW has a subject-oriented, integrated nature, varied time and does not change.

2.4 Extract, Transform, Loading (ETL)

Extraction, Tranformation and Loading (ETL) is the process of extracting, transforming and loading data coming from various data sources. The main function of ETL is to convert data from multiple data sources into useful information (Orsenigo & Vercellis, 2009). ETL process results are then stored into a Data Warehouse. According to Inmon, ETL is the process of retrieving the application data needed and integrating it into the Data Warehouse (Inmon, 2005).

ETL is the activity of processing the retrieval of the required data from various data sources, and then changing and integrating the data to be loaded into the Data Warehouse (El-Sappagh et al., 2011; Trujillo & Luján-Mora, 2003). In the ETL process, data from various sources is periodically extracted and integrated into the Data Warehouse. Defining the scope of ETL is carried out by analyzing each table target (dimensions and facts) need to be done at the beginning of the construction of the ETL process architecture.

2.5 Business Intelligence Analysis and Design Tools

a) Research Flowchart

Symbolic representations that describe the sequence of processes and relationships between processes of an algorithm or procedure to solve a problem, using Flowchart make it easier for users to check the forgotten parts of the analysis. Flowcharts help understand complex and long logical sequences. Flowcharts help communicate the course of the program to others (not programmers) more easily.

b) Supporting Software

1. Microsoft Power Business Intelligence
2. SQL Server Management Studio

c) Business Intelligence Roadmap Methods

In designing and implementing Business Intelligence can use the Business Intelligence Roadmap method which is one of the BI development methods that can be exemplified because of its adaptive nature. In this study, the method discussed is to use the Business Intelligence Roadmap approach (Moss & Atre, 2003).

III. Research Method

The stages of developing a Business Intelligence dashboard at the Holding Company PT JSI Tbk, which specializes in the property and hotel industries are presented in Figure 1.

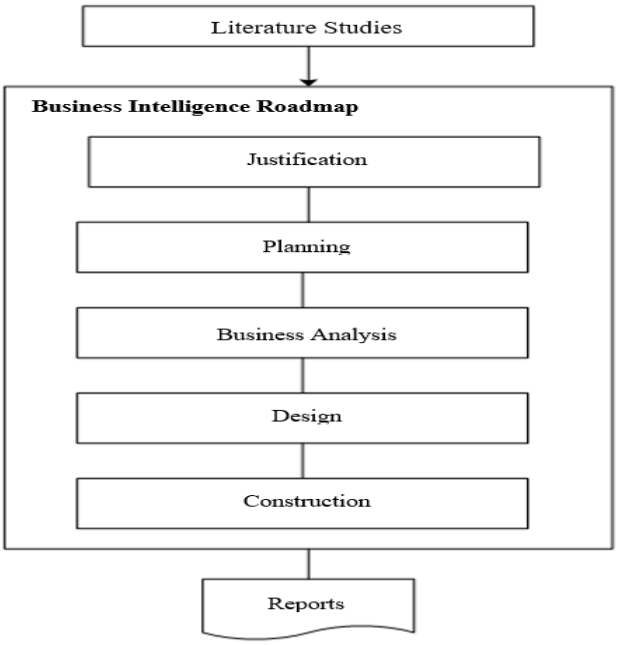


Figure 1. *Research Stages*

Figure 1 above is the stage of creating a Business Intelligence Dashboard. This stage begins from literature studies, justification, planning, business analysis, design, construction, and reports.

Microsoft Power BI is Microsoft's Business Intelligence software that is useful for processing data in more detail and displaying it interactively so as to help users in digging data knowledge to support decisions. The resulting dashboards are the Company revenue dashboard (2019-2021), the Revenue Dashboard by Company (2019-2021), the Branch revenue dashboard (2019-2021), and the Branch revenue dashboard in 2021 based on data for january and February.

IV. Discussion

In this study, the results and discussion of Business Intelligence at the Holding Company of PT JSI Tbk, which concentrates on property and hotel fields consists of Load, Measure and Visualization.

4.1 Load

After the ETL process is completed, the data is loaded into Power BI. Load data generates 6 tables, namely Transaction Facts, Company Dimensions, Branch Dimensions, Customer Dimensions, Currency Dimensions, and Period Dimensions.

CompanyID	BranchID	IsInvoiceOpeningBalance	BatchNo	TrxDate	TaxInvoicePrefix	TaxInvoiceRevisedCount	BillingPeriod	SystemInvoiceNo	InvoiceNo
2015/09/000000000005	2015/09/000000000014	1	OPBLBNV/2019/08/0001	Thursday, August 29, 2019	10	0	201609	TOB/BNV/2016/09/0060	TOB/BNV/2016/09/0060
2015/09/000000000005	2015/09/000000000014	1	OPBLBNV/2019/08/0001	Thursday, August 29, 2019	10	0	201609	TOB/BNV/2016/09/0062	TOB/BNV/2016/09/0062
2015/09/000000000005	2015/09/000000000014	1	OPBLBNV/2019/08/0001	Thursday, August 29, 2019	10	0	201609	TOB/BNV/2016/09/0085	TOB/BNV/2016/09/0085
2015/09/000000000005	2015/09/000000000014	1	OPBLBNV/2019/08/0001	Thursday, August 29, 2019	10	0	201610	TOB/BNV/2016/10/0073	TOB/BNV/2016/10/0073
2015/09/000000000005	2015/09/000000000014	1	OPBLBNV/2019/08/0001	Thursday, August 29, 2019	10	0	201610	TOB/BNV/2016/10/0075	TOB/BNV/2016/10/0075
2015/09/000000000005	2015/09/000000000014	1	OPBLBNV/2019/08/0001	Thursday, August 29, 2019	10	0	201610	TOB/BNV/2016/10/0098	TOB/BNV/2016/10/0098
2015/09/000000000005	2015/09/000000000014	1	OPBLBNV/2019/08/0001	Thursday, August 29, 2019	10	0	201611	TOB/BNV/2016/11/0077	TOB/BNV/2016/11/0077
2015/09/000000000005	2015/09/000000000014	1	OPBLBNV/2019/08/0001	Thursday, August 29, 2019	10	0	201611	TOB/BNV/2016/11/0079	TOB/BNV/2016/11/0079
2015/09/000000000005	2015/09/000000000014	1	OPBLBNV/2019/08/0001	Thursday, August 29, 2019	10	0	201611	TOB/BNV/2016/11/0102	TOB/BNV/2016/11/0102
2015/09/000000000005	2015/09/000000000014	1	OPBLBNV/2019/08/0001	Thursday, August 29, 2019	10	0	201612	TOB/BNV/2016/12/0116	TOB/BNV/2016/12/0116
2015/09/000000000005	2015/09/000000000014	1	OPBLBNV/2019/08/0001	Thursday, August 29, 2019	10	0	201612	TOB/BNV/2016/12/0118	TOB/BNV/2016/12/0118
2015/09/000000000005	2015/09/000000000014	1	OPBLBNV/2019/08/0001	Thursday, August 29, 2019	10	0	201612	TOB/BNV/2016/12/0141	TOB/BNV/2016/12/0141
2015/09/000000000005	2015/09/000000000014	1	OPBLBNV/2019/08/0001	Thursday, August 29, 2019	10	0	201701	TOB/BNV/2017/01/0122	TOB/BNV/2017/01/0122
2015/09/000000000005	2015/09/000000000014	1	OPBLBNV/2019/08/0001	Thursday, August 29, 2019	10	0	201701	TOB/BNV/2017/01/0124	TOB/BNV/2017/01/0124
2015/09/000000000005	2015/09/000000000014	1	OPBLBNV/2019/08/0001	Thursday, August 29, 2019	10	0	201701	TOB/BNV/2017/01/0147	TOB/BNV/2017/01/0147
2015/09/000000000005	2015/09/000000000014	1	OPBLBNV/2019/08/0001	Thursday, August 29, 2019	10	0	201702	TOB/BNV/2017/02/0131	TOB/BNV/2017/02/0131
2015/09/000000000005	2015/09/000000000014	1	OPBLBNV/2019/08/0001	Thursday, August 29, 2019	10	0	201702	TOB/BNV/2017/02/0133	TOB/BNV/2017/02/0133
2015/09/000000000005	2015/09/000000000014	1	OPBLBNV/2019/08/0001	Thursday, August 29, 2019	10	0	201702	TOB/BNV/2017/02/0156	TOB/BNV/2017/02/0156
2015/09/000000000005	2015/09/000000000014	1	OPBLBNV/2019/08/0001	Thursday, August 29, 2019	10	0	201703	TOB/BNV/2017/03/0133	TOB/BNV/2017/03/0133
2015/09/000000000005	2015/09/000000000014	1	OPBLBNV/2019/08/0001	Thursday, August 29, 2019	10	0	201703	TOB/BNV/2017/03/0135	TOB/BNV/2017/03/0135
2015/09/000000000005	2015/09/000000000014	1	OPBLBNV/2019/08/0001	Thursday, August 29, 2019	10	0	201703	TOB/BNV/2017/03/0158	TOB/BNV/2017/03/0158
2015/09/000000000005	2015/09/000000000014	1	OPBLBNV/2019/08/0001	Thursday, August 29, 2019	10	0	201704	TOB/BNV/2017/04/0143	TOB/BNV/2017/04/0143
2015/09/000000000005	2015/09/000000000014	1	OPBLBNV/2019/08/0001	Thursday, August 29, 2019	10	0	201704	TOB/BNV/2017/04/0145	TOB/BNV/2017/04/0145
2015/09/000000000005	2015/09/000000000014	1	OPBLBNV/2019/08/0001	Thursday, August 29, 2019	10	0	201704	TOB/BNV/2017/04/0168	TOB/BNV/2017/04/0168
2015/09/000000000005	2015/09/000000000014	1	OPBLBNV/2019/08/0001	Thursday, August 29, 2019	10	0	201705	TOB/BNV/2017/05/0141	TOB/BNV/2017/05/0141
2015/09/000000000005	2015/09/000000000014	1	OPBLBNV/2019/08/0001	Thursday, August 29, 2019	10	0	201705	TOB/BNV/2017/05/0143	TOB/BNV/2017/05/0143
2015/09/000000000005	2015/09/000000000014	1	OPBLBNV/2019/08/0001	Thursday, August 29, 2019	10	0	201705	TOB/BNV/2017/05/0166	TOB/BNV/2017/05/0166

Figure 2. *The Data of Transaction Fact*

As shown by Figure 2, the transaction data that has been loaded can be seen by selecting the data menu and the FactTransaction field.

CompanyID	CompanyName	CompanyShortName	ParentCompanyID	DocumentPrefix
2015/09/000000000001	Jan Darmadi Investindo, PT	JDI	2015/09/000000000001	JDI
2015/09/000000000002	Jakarta Setiabudi Internasional, Tbk. PT	JSI	2015/09/000000000002	JSI
2015/09/000000000003	Antilope Madju, PT	AM	2015/09/000000000003	AM
2015/09/000000000004	Hotel Cikini Realty, PT	HCR	2015/09/000000000004	HCR
2015/09/000000000005	Bali Nusadewata Village, PT	BNV	2015/09/000000000005	BNV
2015/09/000000000006	Wynncor Bali, PT	WYN	2015/09/000000000006	WB
2015/09/000000000007	Metropolitan Realty Internasional, PT	MRI	2015/09/000000000007	MRI
2015/09/000000000008	Skyline Building, PT	SKY	2015/09/000000000008	SKY
2015/09/000000000009	Copylas Indonesia, PT	CI	2015/09/000000000009	CI
2015/09/000000000010	Permata Hijau, PT	PH	2015/09/000000000010	PH
2015/09/000000000011	Bangun Hotel Nusantara, PT	BHN	2018/04/000000000002	BHN
2015/09/000000000012	Darsana Tempa Internasional, PT	DTI	2015/09/000000000012	DTI
2015/09/000000000013	Rasuna Setiabudi Raya, PT	RSR	2015/09/000000000013	RSR
2015/10/000000000001	JO KSO Proyek Setiabudi Rasuna	KSO	2015/10/000000000001	KSO
2017/10/000000000001	Jantra Swarna Dipta, PT	JSD	2017/10/000000000001	JSD
2018/04/000000000001	Bumi Kelola Selaras, PT	BKS	2018/04/000000000001	BKS

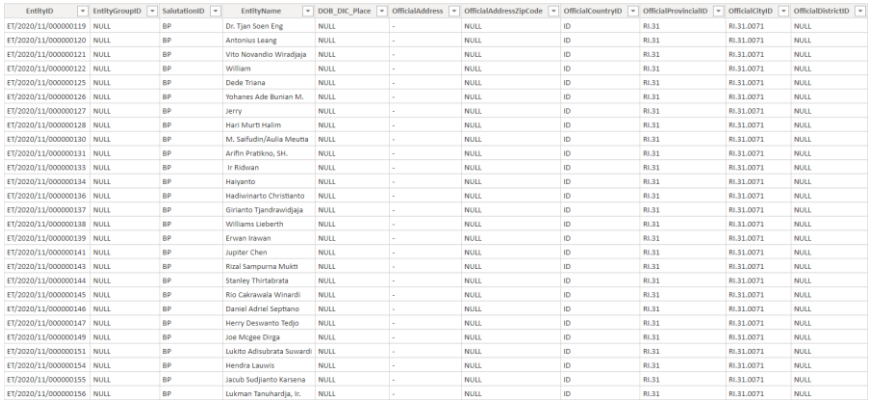
Figure 3*. Company Dimension Data*

According to Figure 3, it shows that the Company data that has been loaded on Power BI can be seen by selecting the data menu and the DimCompany field.

CompanyID	BranchID	BranchName	ParentBranchID	DocumentPrefix
2015/09/000000000001	2015/09/000000000001	JDI Head Office	2015/09/000000000001	JDI
2015/09/000000000001	2015/09/000000000002	Djakarta Theater	2015/09/000000000002	DJ
2015/09/000000000001	2015/09/000000000003	Taman Puri Oasis	2015/09/000000000003	TPO
2015/09/000000000002	2015/09/000000000004	JSI Head Office	2015/09/000000000004	HO
2015/09/000000000002	2015/09/000000000005	Setiabudi One	2015/09/000000000005	SB1
2015/09/000000000002	2015/09/000000000006	Setiabudi Dua	2015/09/000000000006	SB2
2015/09/000000000002	2015/09/000000000007	Setiabudi Atrium	2015/09/000000000007	SBA
2015/09/000000000002	2015/09/000000000008	Plaza Menteng Retail	2015/09/000000000008	PM
2015/09/000000000002	2015/09/000000000009	Plaza Menteng Hotel	2015/09/000000000009	PMH
2015/09/000000000002	2015/09/000000000010	Mercure Resort Sanur	2015/09/000000000010	MRS
2015/09/000000000002	2015/09/000000000011	Mega Kuningan	2015/09/000000000011	MK
2015/09/000000000002	2018/07/000000000003	Setiabudi Residence	2018/07/000000000003	SBR
2015/09/000000000002	2019/07/000000000003	Mercure Resort Sanur (Operator)	2019/07/000000000003	MRO
2015/09/000000000002	2019/07/000000000004	Plaza Menteng Hotel (Operator)	2019/07/000000000004	PMO
2015/09/000000000002	IBM/JSI/2019/08/0001	MRS-Combine	IBM/JSI/2019/08/0001	MRC
2015/09/000000000002	IBM/JSI/2019/08/0002	PM Hotel-Combine	IBM/JSI/2019/08/0002	PHC
2015/09/000000000002	IBM/JSI/2019/08/0003	PM-Combine	IBM/JSI/2019/08/0003	PCH
2015/09/000000000002	IBM/JSI/2019/08/0004	JSI-Combine	IBM/JSI/2019/08/0004	JSC
2015/09/000000000003	2015/09/000000000016	AM Head Office	2015/09/000000000016	AM
2015/09/000000000003	2018/04/000000000002	Hyatt Regency Yogyakarta (Head Office)	2018/04/000000000002	HRY
2015/09/000000000003	2019/07/000000000002	Hyatt Regency Yogyakarta (Operator)	2019/07/000000000002	HRO
2015/09/000000000003	IBM/AM/2019/08/00001	AM-Combine	IBM/AM/2019/08/00001	AMC
2015/09/000000000003	IBM/AM/2019/08/00002	HRY-Combine	IBM/AM/2019/08/00002	HRC
2015/09/000000000004	2015/09/000000000012	Cikini Retail	2015/09/000000000012	HCR
2015/09/000000000004	2015/09/000000000013	Cikini Hotel	2015/09/000000000013	HCH
2015/09/000000000004	2019/07/000000000005	Cikini Hotel (Operator)	2019/07/000000000005	HCO
2015/09/000000000004	IBM/HCR/2019/08/0001	HCR Hotel-Combine	IBM/HCR/2019/08/0001	HHC
2015/09/000000000004	IBM/HCR/2019/08/0002	HCR-Combine	IBM/HCR/2019/08/0002	HCC

Figure 4. *Branch Dimension Data*

Figure 4 above describes the branch data that has been loaded on Power BI which can be seen by selecting the data menu and DimBranch field.



EntityID	EntityGroupID	SalutationID	EntityName	DOB_DIC_Place	OfficialAddress	OfficialAddressZipCode	OfficialCountryID	OfficialProvincialID	OfficialCityID	OfficialDistrictID
ET/2020/11/000000119	NULL	BP	Dr. Tjan Soen Eng	NULL	-	NULL	ID	RI.31	RI.31.0071	NULL
ET/2020/11/000000120	NULL	BP	Antonius Leang	NULL	-	NULL	ID	RI.31	RI.31.0071	NULL
ET/2020/11/000000121	NULL	BP	Vito Novandio Wiradjaja	NULL	-	NULL	ID	RI.31	RI.31.0071	NULL
ET/2020/11/000000122	NULL	BP	William	NULL	-	NULL	ID	RI.31	RI.31.0071	NULL
ET/2020/11/000000125	NULL	BP	Dede Triana	NULL	-	NULL	ID	RI.31	RI.31.0071	NULL
ET/2020/11/000000126	NULL	BP	Yohanes Ade Bunian M.	NULL	-	NULL	ID	RI.31	RI.31.0071	NULL
ET/2020/11/000000127	NULL	BP	Jerry	NULL	-	NULL	ID	RI.31	RI.31.0071	NULL
ET/2020/11/000000128	NULL	BP	Hari Murti Halim	NULL	-	NULL	ID	RI.31	RI.31.0071	NULL
ET/2020/11/000000130	NULL	BP	M. Saifudin/Aulia Meutia	NULL	-	NULL	ID	RI.31	RI.31.0071	NULL
ET/2020/11/000000131	NULL	BP	Arifin Pratikno, SH.	NULL	-	NULL	ID	RI.31	RI.31.0071	NULL
ET/2020/11/000000133	NULL	BP	Ir Ridwan	NULL	-	NULL	ID	RI.31	RI.31.0071	NULL
ET/2020/11/000000134	NULL	BP	Haiyanto	NULL	-	NULL	ID	RI.31	RI.31.0071	NULL
ET/2020/11/000000136	NULL	BP	Hadiwinarto Christianto	NULL	-	NULL	ID	RI.31	RI.31.0071	NULL
ET/2020/11/000000137	NULL	BP	Girianto Tjandrawidjaja	NULL	-	NULL	ID	RI.31	RI.31.0071	NULL
ET/2020/11/000000138	NULL	BP	Williams Lieberth	NULL	-	NULL	ID	RI.31	RI.31.0071	NULL
ET/2020/11/000000139	NULL	BP	Erwan Irawan	NULL	-	NULL	ID	RI.31	RI.31.0071	NULL
ET/2020/11/000000141	NULL	BP	Jupiter Chen	NULL	-	NULL	ID	RI.31	RI.31.0071	NULL
ET/2020/11/000000143	NULL	BP	Rizal Sampurna Mukti	NULL	-	NULL	ID	RI.31	RI.31.0071	NULL
ET/2020/11/000000144	NULL	BP	Stanley Thirtabrata	NULL	-	NULL	ID	RI.31	RI.31.0071	NULL
ET/2020/11/000000145	NULL	BP	Rio Cakrawala Winardi	NULL	-	NULL	ID	RI.31	RI.31.0071	NULL
ET/2020/11/000000146	NULL	BP	Daniel Adriel Septiano	NULL	-	NULL	ID	RI.31	RI.31.0071	NULL
ET/2020/11/000000147	NULL	BP	Herry Deswanto Tedjo	NULL	-	NULL	ID	RI.31	RI.31.0071	NULL
ET/2020/11/000000149	NULL	BP	Joe Mogee Dirga	NULL	-	NULL	ID	RI.31	RI.31.0071	NULL
ET/2020/11/000000151	NULL	BP	Lukito Adisubrata Suwardi	NULL	-	NULL	ID	RI.31	RI.31.0071	NULL
ET/2020/11/000000154	NULL	BP	Hendra Lauwis	NULL	-	NULL	ID	RI.31	RI.31.0071	NULL
ET/2020/11/000000155	NULL	BP	Jacub Sudjianto Karsena	NULL	-	NULL	ID	RI.31	RI.31.0071	NULL
ET/2020/11/000000156	NULL	BP	Lukman Tanuhardja, Ir.	NULL	-	NULL	ID	RI.31	RI.31.0071	NULL

Figure 5. *Customer Dimension Data*

Figure 5 above displays customer data that has been loaded on Power BI which can be seen by selecting the data menu and DimCustomer field.

CurrencyID	CurrencyName	BaseCurrencyUnique
EUR	Euro	EUR
IDR	Indonesian Rupiah	IDR
USD	United States Dollars	USD
YEN	Japan YEN	YEN

Figure 6. *Currency Dimension Data*

Figure 6 above shows the Currency data that has been loaded on Power BI which can be seen by selecting the data menu and the DimCurrency field.

Period	PeriodeDate	PeriodDescription
201701	Sunday, January 1, 2017	Jan-17
201702	Wednesday, February 1, 2017	Feb-17
201703	Wednesday, March 1, 2017	Mar-17
201704	Saturday, April 1, 2017	Apr-17
201705	Monday, May 1, 2017	May-17
201706	Thursday, June 1, 2017	Jun-17
201707	Saturday, July 1, 2017	Jul-17
201708	Tuesday, August 1, 2017	Aug-17
201709	Friday, September 1, 2017	Sep-17
201710	Sunday, October 1, 2017	Oct-17
201711	Wednesday, November 1, 2017	Nov-17
201712	Friday, December 1, 2017	Dec-17
201801	Monday, January 1, 2018	Jan-18
201802	Thursday, February 1, 2018	Feb-18
201803	Thursday, March 1, 2018	Mar-18
201804	Sunday, April 1, 2018	Apr-18
201805	Tuesday, May 1, 2018	May-18
201806	Friday, June 1, 2018	Jun-18
201807	Sunday, July 1, 2018	Jul-18
201808	Wednesday, August 1, 2018	Aug-18
201809	Saturday, September 1, 2018	Sep-18
201810	Monday, October 1, 2018	Oct-18
201811	Thursday, November 1, 2018	Nov-18
201812	Saturday, December 1, 2018	Dec-18
201901	Tuesday, January 1, 2019	Jan-19
201902	Friday, February 1, 2019	Feb-19
201903	Friday, March 1, 2019	Mar-19
201904	Monday, April 1, 2019	Apr-19

Figure 7. *Period Dimension Data*

Figure 7 above displays the data that the Load process has done on Power BI which can be seen by selecting the data menu and the DimPeriod field.

4.2 Measure

After the data load process, the data will go through the Measure stage or mathematical operation calculations against it. Therefore, this research resulted in 4 Measures, namely PT JSI Tbk's revenue, Company's revenue, Branch's revenue, and Branch's 2021 revenue.

a. Measure Revenue of PT JSI Tbk (2019-2021)

Measure pt JSI tbk's revenue using data from *the Transaction* fact table, by taking transaction data from January 2019 to February 2021.

Month	2019	2020	2021
January	45,177,690,963.68	32,086,845,221.09	32,531,592,440.10
February	68,767,062,404.99	53,256,357,767.51	8,244,050,485.79
March	89,169,097,898.88	73,784,121,641.28	
April	111,663,714,644.49	75,994,838,201.32	
May	135,081,801,351.65	77,112,708,225.36	
June	159,354,079,111.72	80,266,822,406.46	
July	198,119,836,534.02	82,150,028,174.40	
August	222,867,889,647.68	111,697,593,819.65	
September	247,630,524,324.10	125,409,333,911.05	
October	268,288,476,541.37	142,174,728,640.00	
November	290,577,326,762.93	152,930,177,632.23	
December	332,951,142,974.95	171,223,956,320.90	

***Figure 8**. PT JSI Tbk Revenue Measure Data (2019-2021)*

As shown by Figure 8 which uses Measure TV as 2021, 1YP as 2020, and 2YP as 2019. Data is filtered by transaction date (Invoice date), filter based on 2021 which later the data can be seen in the visualization.

b. Measure Revenue of Company (2019-2021)

Measure revenue based on the Company using data from the Transaction fact table, by taking transaction data from January 2019 to February 2021.

Company	2019	2020	2021
JSI	52.03%	57.36%	62.59%
BNV	26.70%	20.75%	5.72%
SKY	18.78%	19.42%	30.25%
HCR	2.49%	2.47%	1.45%

***Figure 9.** Revenue Measure Data by Company (2019-2021)*

According to Figure 9, data in the filter based on the transaction date (Invoice date) and Company, Filter based on 2021 which will later be visualized and filter the Company using Head Office data and 3 subsidiaries namely JSI, BNV, SKY, and HCR.

c. Measure Branch Revenue (2019-2021)

Measure revenue based on Branch using data from the Transaction fact table, by taking transaction data from January 2019 to February 2021.

Branch	2019	2020	2021
BNV	26.70%	20.75%	5.72%
SBA	23.73%	23.81%	31.57%
MC	18.78%	19.42%	30.25%
SB1	15.00%	15.03%	18.69%
SB2	11.62%	16.61%	10.63%
HCR	2.49%	2.47%	1.45%
PM	1.68%	1.92%	1.69%

***Figure 10**. Measure Revenue Data by Branch (2019-2021)*

Based on Figure 10 above, it shows that data in the filter based on the transaction date (Invoice date) and Branch, Filter based on 2021 which later the data will be visualized and filter branch using data from 7 branches of the company, namely BNV, SB1, SB2, SBA, MC, HCR, and PM.

d. Measure Branch Revenue for 2021

Measure revenue based on Branch using data from the Transaction fact table, by retrieving transaction data for 2021.

Branch	Income
SBA	31.57%
MC	30.25%
SB1	18.69%
SB2	10.63%
BNV	5.72%
PM	1.69%
HCR	1.45%

***Figure 11**. Measure Branch Revenue of 2021*

According to Figure 11 above, data in the filter based on the transaction date (Invoice date) and Branch, Filter based on 2021 which later the data will be visualized and filter branch using data from 7 branches of the company, namely BNV, SB1, SB2, SBA, MC, HCR, and PM.

4.3 Visualization

After completing the entire visual representation of the data, the data set is put together into the Dashboard. Dashboard is a visual display containing information needed by managerial and stakeholders to assist in monitoring and as a basis for analysis for decision making.

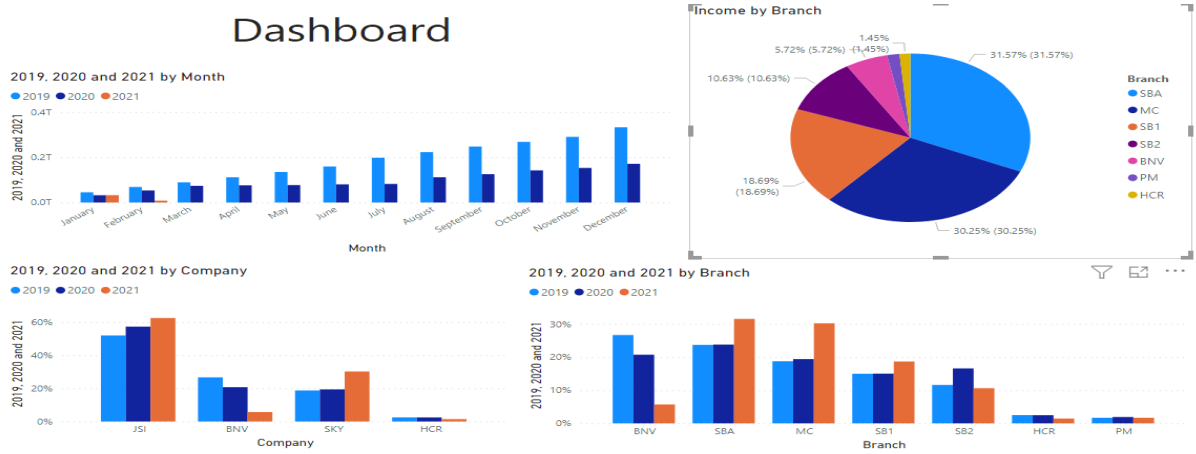


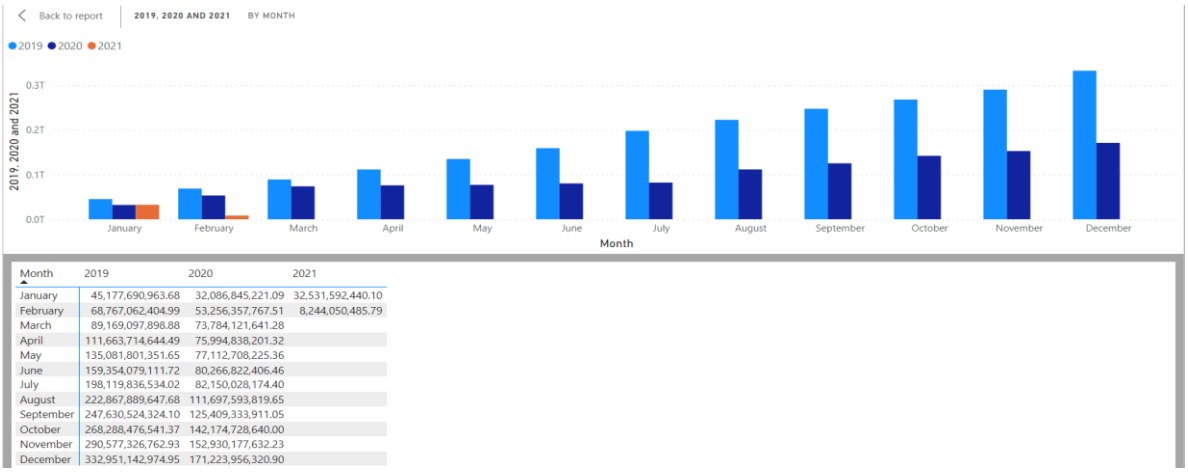
Figure 12. *Dashboard of PT JSI Tbk*

As shown by Figure 12, dashboard information related to company revenue, there are 4 types of Dashboards generated, namely Dashboard revenue of PT JSI Tbk (2019-2021), revenue based on Company (2019-2021), revenue based on Branch (2019-2021), and revenue based on Branch year 2021.

4.3 Discussion

a. Dashboard Revenue of PT JSI Tbk (2019-2021)

The results of the data visualization from Measure, which has been defined in the Revenue Measure of PT JSI Tbk, show the total revenue by month in the period January 2019 to February 2021. The revenue visualization of PT JSI Tbk January 2019 to February 2021 can be seen in following figure.



Month	2019	2020	2021
January	45,177,690,963.68	32,086,845,221.09	32,531,592,440.10
February	68,767,062,404.99	53,256,357,767.51	8,244,050,485.79
March	89,169,097,898.88	73,784,121,641.28	
April	111,663,714,644.49	75,994,838,201.32	
May	135,081,801,351.65	77,112,708,225.36	
June	159,354,079,111.72	80,266,822,406.46	
July	198,119,836,534.02	82,150,028,174.40	
August	222,867,889,647.68	111,697,593,819.65	
September	247,630,524,324.10	125,409,333,911.05	
October	268,288,476,541.37	142,174,728,640.00	
November	290,577,326,762.93	152,930,177,632.23	
December	332,951,142,974.95	171,223,956,320.90	

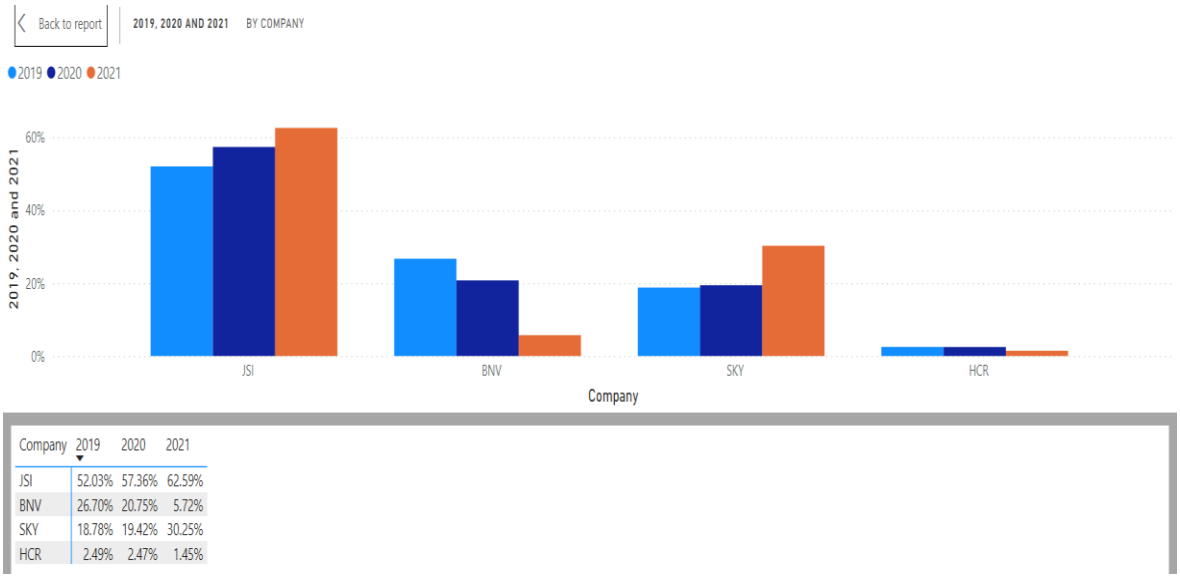
Figure 13. *Revenue Visualization of PT JSI Tbk (2019-2021)*

As shown by Figure 13, the visualization shows the total revenue of PT JSI Tbk from January 2019 to February 2021. Based on the figure above, it can be seen that in 2019 the company's highest revenue with total revenue in December 2019 was Rp. 332.951.142.974. In 2020 since the enactment of large-scale activity restrictions, the company's revenue has dropped dramatically with a total revenue of Rp. 171.223.956.320. The difference in revenue with a total of Rp. 161.727.186.654.

In January 2021, revenues improved slightly. January 2021 data is used as a comparison where the company's total revenue with a total of Rp 32.086.845.221, while in January 2021 the total revenue was Rp 35.531.952.440. The decline occurred again in the following month; February 2021 the company's total revenue was only 8.244.050. It can be concluded that the impact of large-scale activity restrictions has resulted in companies experiencing drastic and significant revenue losses by comparing 2019 data with 2020, so that in 2021 operational cost efficiency must be carried out or make attractive offers such as discounts.

b. Company Revenue Dashboard (2019-2021)

The results of the data visualization of the Measure that has been defined, in measure revenue company (2019-2021). The visualization shows total revenue by year in the period 2019 to 2021 using Head Office data and 3 subsidiaries.



Company	2019	2020	2021
JSI	52.03%	57.36%	62.59%
BNV	26.70%	20.75%	5.72%
SKY	18.78%	19.42%	30.25%
HCR	2.49%	2.47%	1.45%

Figure 14. *Company Revenue Visualization (2019-2021)*

According to Figure 14, the visualization shows the Company's total transactions in the period 2019-2021. Based on Measure data, revenue based on the Company in 2020 and 2021 JSI's company revenue is the highest revenue and shows positive revenue growth with a percentage of 2019 revenue as many as 52.03%, while in 2020 revenue rose to 57.36%, and in 2021 it rose again to 62.59%.

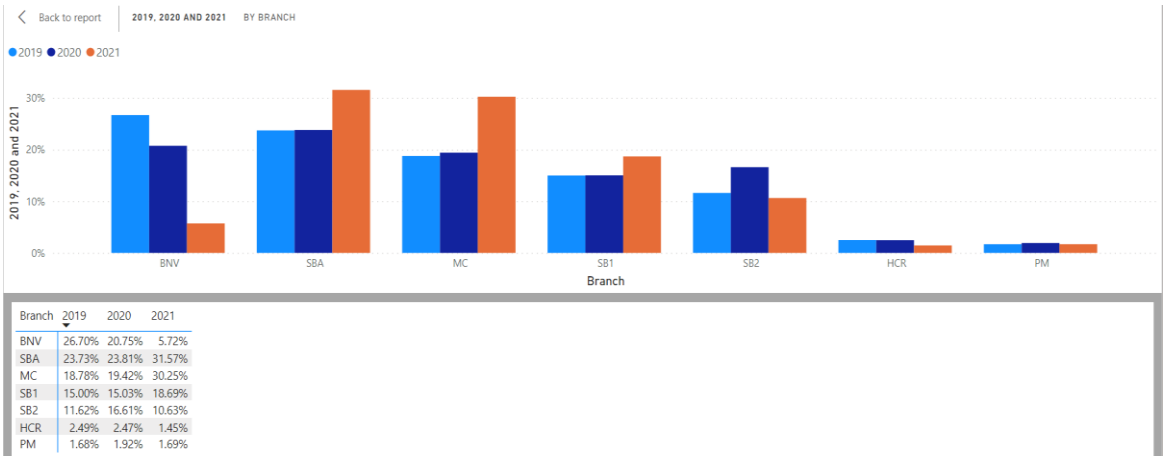
At the same time, revenue data on HCR is the lowest income with a total percentage in 2019 of 2.49%, down 0.2% in 2020 with a total percentage of 2.47%, and in 2021 experienced a decrease with a total percentage of 1.45%. Meanwhile, SKY companies increased slowly with a total percentage of revenue in 2019 as many as 18.78%, while in 2020 the total percentage of revenue was 19.42%, and in 2021 it rose by 20.83% with a total percentage of revenue of 30.35%.

A significant decrease from 2019 to 2021 was combined with BNV companies with a total percentage of revenue in 2019 as many as 26.70%, while in 2020 the total percentage of revenue of 20.75%, and in 2021 it decreased significantly by 15.93 with a total percentage of revenue of 5.72%. Hence, it can be concluded that the impact of large-scale activity restrictions resulted in the company experiencing a drastic and significant decline

in company revenues in HCR and BNV, resulting in revenue sharing in companies that experienced a decrease in revenue to cover operating expenses.

c. Branch Revenue Dashboard (2019-2021)

The results of the data visualization of measure that has been defined in Measure Revenue Branch (2019-2021). The visualization shows the total revenue by year in the period 2019 to 2021 using data from 7 branches of the company. Branch's revenue visualization in 2019 to 2021 can be seen in the following figure.



Branch	2019	2020	2021
BNV	26.70%	20.75%	5.72%
SBA	23.73%	23.81%	31.57%
MC	18.78%	19.42%	30.25%
SB1	15.00%	15.03%	18.69%
SB2	11.62%	16.61%	10.63%
HCR	2.49%	2.47%	1.45%
PM	1.68%	1.92%	1.69%

***Figure 15**. Branch Revenue Visualization (2019-2021)*

As shown in Figure above, the graph visualization shows the total transactions at each branch for the period 2019-2021. Measure revenue data based on Branch in 2020 and 2021, the highest income occurred SBA, MC, SB1 branches. The SBA showed the postive and highest revenue growth with a percentage of revenue in 2019 as many as 23.73%, while in 2020 of 23.81% and in 2021 it rose to 31.57% with a comparison of 7.76% in the previous year.

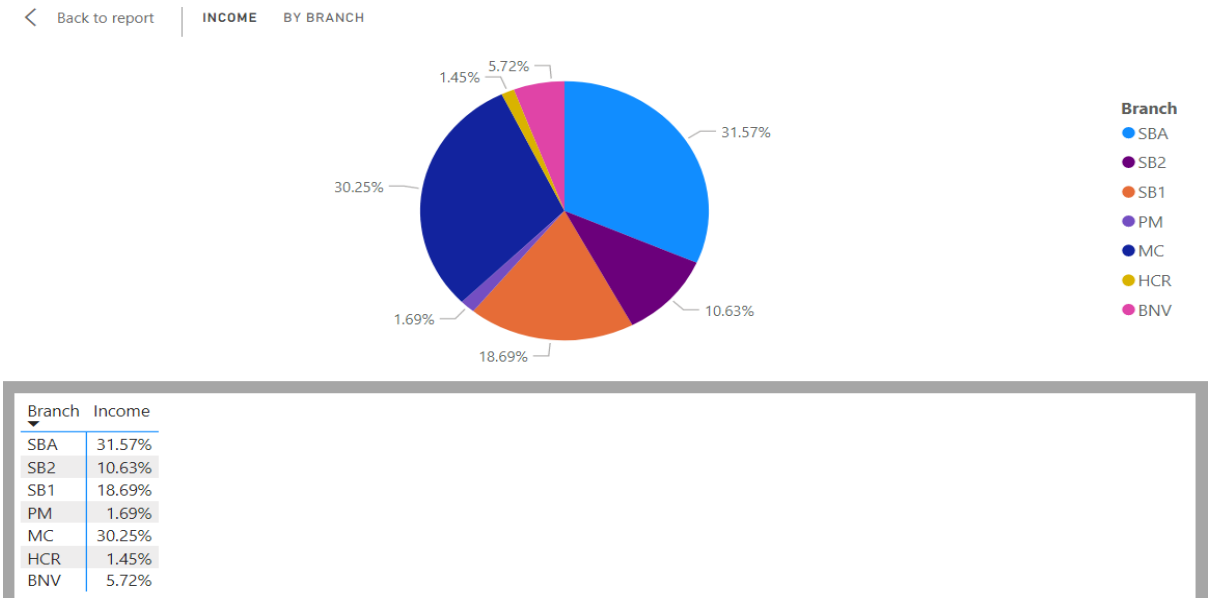
MC data shows revenue growth with a percentage of revenue in 2019 as many as 18.78%, while in 2020 19.42%, and in 2021 rose to 30.25% with a comparison of an increase of 10.83% in the previous year. SB1 data shows revenue growth with a percentage of revenue in 2019 of 15.00%, in 2020 of 15.03% and in 2021 it rose to 18.69%. SB2 data shows a decrease in revenue with a percentage of revenue in 2019 of 11.62%, in 2020 16.61% and in 2021 it rose to 10.63%.

HCR data shows a decrease in revenue with a percentage of revenue in 2019 as many as 2.49%, while in 2020 2.47% and in 2021 it rose to 1.45%. Meanwhile, PM data shows a decrease in revenue with a percentage of revenue in 2019 as many as 1.68%, while in 2020 of 1.92% and in 2021 it rose to 1.69%.

BNV data shows a decrease in revenue with a percentage of revenue in 2019 as many as 27.70%, while in 2020 of 20.75% and in 2021 it fell to 5.72% which experienced a very drastic decrease with a total percentage decrease of 15,03. Therefore, it can be concluded that the impact of large-scale activity restrictions resulted in branches owned by the company, experiencing a drastic and significant decrease in company revenues occurring in BNV, SB2, HCR and PM so that strict operational cost efficiency must be carried out.

d. Branch Revenue Dashboard of 2021

The results of the data visualization of *measure* that has been defined in, *Measure Branch* revenue in 2021. Visualization displays total branch revenue based on 2021 using data from 7 branches of the company.



Branch	Income
SBA	31.57%
SB2	10.63%
SB1	18.69%
PM	1.69%
MC	30.25%
HCR	1.45%
BNV	5.72%

Figure 16. *Branch Revenue Visualizations for 2021*

According to Figure above, the visualization shows the total transactions at each branch in 2021. Measure data on revenue by Branch in 2021, the highest income occurred in SBA, MC, SB1, SB2 branches. The SBA data had the highest percentage of revenue at 30.25% in 2021. MC data has a percentage of revenue of 31.57% in 2021.

Furthermore, SB1 data has a percentage of revenue at 18.69% in 2021. SB2 has data percentage of revenue of 10.63%. BNV data has a percentage of revenue of 5.72%. PM data has a percentage of revenue of 1.69%. Meanwhile, HCR data has the lowest percentage of income at 1.45%. Thus, it can be concluded that the BNV, PM, and HCR branches must be improved revenue performance and operational efficiency of the company.

V. Conclusion

This research successfully created Dashoard Business Intelligence and evaluated revenue data at PT JSI, an Operating Holding Company that focuses on property and hotel management, in order to assist the company in making decisions regarding the performance of each branch. The resulting dashboard visualizes data in the form of graphs for the period 2019-2021. This dashboard assists managers and stakeholders in understanding current company development in the face of an economic crisis caused by the COVID-19 pandemic and government laws restricting activity, allowing it to be utilized as a basis for decision making.

Dashboard Visualizations resulted are Company revenue dashboard (2019-2021), Revenue Dashboard by Company (2019-2021), Branch Revenue dashboard (2019-2021), and Branch revenue dashboard in 2021 based on data from January and February. The results of the analysis based on the designed visualization show that the impact of large-scale restriction policies makes performance declines in the BNV, PM, and HCR branches, so that the marketing department must improve revenue performance or operational cost efficiency.

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