BUSINESS INTELLIGENCE MATURITY ASSESSMENT: A CASE STUDY ON AN INDONESIAN AUTOMOTIVE COMPANY

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Abstract

Abstract— The increasing volume of data, systems that became more complex, and the need for tools to collect, store and process data have driven automotive companies to implement Business Intelligence (BI) system. Successful adoption of BI technology enables organizations to have higher business effectiveness and IT investment. In the organization that newly adopt BI technology, BI Project often failed. In organizations that already implement BI system, also often unable to get full benefits of the system. Maturity assessment is a method for assessing to which maturity level of human resources, organizational processes, and technology is implemented in an organization or company. By conducting it will provide the company with an overview of where the current maturity level is and provides an overview of the roadmap for achieving a higher maturity level where a higher level results in good business effectiveness. Investigate the maturity level of BI system focusing on an Indonesian automotive company and which parameter need to be improved are the objectives of this study. For BI maturity assessment in an Indonesian automotive company, we use the Business Intelligence maturity model (biMM) [1]. The study found that the overall organization's maturity level to adopt BI system is 3.05 which means company is on the third stage biMM: information integration. Technology maturity is on the lowest point with an average of 2.87 point, Functionality is in the middle with 2.94 point, and Organization have highest point with 3.26 point. The company can improve on SLA Awareness, Data Management, and Data Architecture while retaining the performance of BI Strategy & BI Governance.

Keyword: *Business Intelligence, BI Maturity Model, Automotive, Indonesia.*

1. INTRODUCING

Currently, companies are increasingly aware of the importance of using information systems (IS). By utilizing IS, companies can run the company's business well from upstream to downstream. In addition, with good IS management and processing, companies can defend themselves from existing business competition. The use of IS is not only limited to recording operational activities or business transactions, but is also used in business processes, business strategy determination, and executive decision making. This causes the need for proactive and systemic business information to increase compared to the previous few decades.

All companies currently need accurate and up-to-date data for the continuity of running the company's business. [2]. The increasing volume of data produced by companies, increasingly complex systems, and the need for tools to collect, store and process data are driving automotive companies to implement Business Intelligence. Business Intelligence system, further abbreviated to BI system, covers process and technologies for gathering, storing, accessing and analyzing data to make decisions [3]. Meanwhile, based on Popovic, BI is a tool for business users for various purposes such as collecting data, accessing data, and analyzing data to make business decisions [4].

The application of BI can be utilized optimally, if the implementation is carried out in accordance with the vision and mission of the company and supported by appropriate management and regulation, so that losses that may occur can be avoided. The loss can arise from problems such as cases of data loss in reports caused by program problems in the data warehouse, inaccurate information caused by incorrect data processing so that data integrity cannot be maintained, procurement of high-value investments but not offset by a corresponding return of value. These losses were largely due to the planning and implementation of the BI system which did not work as expected. These things will greatly influence

decision making, including affecting the effectiveness and efficiency in achieving organizational goals and business strategies [5].

The full benefits of BI will be felt by the organization if the organization is mature enough in implementing the BI system [6]. To check the organization maturity for BI adoption, we can conduct a maturity assessment. By conducting a maturity assessment using the maturity model, we can measure the extent to which people, processes and technology are implemented within the organization [7]. By conducting it will provide the company with an overview of where the current maturity level is and provides an overview of the roadmap for achieving a higher maturity level where a higher level results in good business effectiveness [7], [8], [9], [10]. By knowing the benefits that will be obtained if pursuing a higher level of maturity, the organization will be motivated to do so.

In one of Indonesia automotive company that handling sales and distribution related Japanese brand, BI system already implemented since 2016. The implementation of BI system covering analysis and reporting from Car Production Planning, Carpool Management, and 3S analysis: Car Retail Sales (Sales), Periodical Maintenance (Service), and Spare Part Retail Sales (Spare Part) across Indonesia. Based on internal data, during 2017 – 2019, investment related to the BI system has significantly increased between 15-20% every year. The user request related to the BI system also significantly increased 15-20% every year.

Despite the investment value and user request that increased every year, management often found that the company not yet get full benefits from the adoption of BI system. The analysis, in the form of dashboard and the static report that has already been created, 60% of them not used anymore in several department of company, vary 3-6 months after the implementation finished. The user that using BI system also experience fluctuation, up and down, that the cases are user increased using BI system after implementation, then decreased gradually vary after 3-6 months. Several problems also occur such as data integrity cannot be maintained, reported information is inaccurate, the system is not reliable, application access times are slow and sometimes inaccessible, server capacity is full, slow time in downloading information from the system, complaints unresponsive users.

Several research related to the BI maturity model in an organization has been conducted before. Eybers et al (2019), conduct investigation about Business Intelligence Maturity in Mozambik, focusing on manufacturing companies [11]. Shah et al (2018), conduct investigation in Pakistan to assess the implementation of BI [12]. Studies that focusing on Indonesian context conducted by Primadewi et al (2017), that study about BI maturity model in a university [13]. It is found that the study focusing on investigate business intelligence maturity model on Indonesia automotive company has never been done before.

Investigate the maturity level of BI System focusing on an Indonesian automotive company is the objective of this study. The research question is *"what is the level of BI system maturity reached by the one of Indonesian automotive company? Which parameter needs to be improved?"*. By answering the questions. the company can know their position in implementing BI and can do some follow up improvement based on this study, and hence, increase their competitiveness in the market [9], [10].

In this research, the author is using Business Intelligence Maturity Model (biMM) [1] to check the maturity level in the company. The biMM model has been used, for example, in Germany by industry practitioners and is extensively documented. The evaluation method also considers people, process and technologies perspective, so that this method is considered relevant to be used in this study.

The author arranges the sections in this paper as follows: In section II, the author explains the research method. In section III, we will discuss the results of the research and provide recommendations. Finally, Section IV concludes the research.

2. RESEARCH METHODS

2.1 Business Intelligence

The definition of BI can vary, but the following definition from Wixom [3] is useful:

Business intelligence (BI) is a broad category of technologies, applications, and processes for gathering, storing, accessing, and analyzing data to help its users make better decisions.

In short, Business Intelligence (BI) is a tool and system used for strategic planning in various organizational sizes. BI is divided into two perspectives, namely technical and business. For a technical perspective, BI refers to the integration between technology, tools, and software products to collect various data which will then be integrated and analyzed [14]. In the business perspective BI is a philosophy and methodology that works with information, knowledge, open communication, and knowledge sharing, and an analytical approach to business process organizational needs [14].

2.2 Maturity Model

Total Quality Management (TQM) is what inspires the concept of the maturity model that exists today [15]. Talib [16] defines TQM as a framework which is intended to promote continuous and sustained improvement in quality and performance, and develops an attitude of quality culture. Like the technical quality approach, TQM emphasizes the importance of input and develops it from technical competence, also include the importance of people's motivation and ability to work in teams in order to solve problems. Organizations will receive benefits, increasing competitive advantage as a result of reducing production costs and improving quality [17], [18].

When Humphrey and colleagues studied software quality, they noticed that the quality of the processes involved in creating software has a correlation with the results of software quality. [19]. Then the maturity model concept was created, adapted from Crosby's quality management [19], [20], [21]. This resulted in the development of subject-specific maturity models such as in software engineering and eventually expanding to BI systems.

2.3 Current BI Maturity Model

BI maturity model is a method for measuring the maturity level of BI system implementation within an organization or company. There are several models to measure the maturity level of BI implementation, both those made by industry practitioners and collaborations between academics and industry practitioners. The BI maturity model found in the literature [11] is briefly presented in comparison in Table 1.

Table 1. Comparison of BI maturity models

Maturity model	Focus
Business Intelligence Development Model (BIDM)	Integration of existing BI development stages of various maturity models to propose a framework for holistic BI maturity assessment
Enterprise Business Intelligence Maturity Model (EBI2M)	BI maturity model considering a staged representation and continuous representation considering five evolutionary maturity levels (Initial, Managed, Defined, Quantitatively Managed and Optimized)
Gartner BI maturity model	Five levels of maturity, namely Unaware, Initial, Standards, Enterprise and Transformative
The Data Warehousing Institute's (TDWI) maturity model	Six maturity stages, namely Prenatal, Infant, Child, Teenager, Adult and Sage
The ladder of business intelligence (LOBI)	Six maturity levels (Facts, Data, Information, Knowledge, Understanding and Enabled Intuition) considering organizational business strategy and the people, processes, and technology
Business Intelligence Maturity Model (biMM)	Focus on three perspectives namely Functionality, Technology and Organization with sub dimensions

To be able to continue research, we need to select a maturity model. We comparing the BI maturity model as presented in Table 1, then elimination is carried out based on comparative analysis. The first comparative analysis is to compare the documentation which is quite clear regarding the method of measuring the maturity level. In EBI2M, BIDM and LOBI from the results of the literature study it was felt that they were not well-documented regarding the method of measurement, so they were eliminated. Furthermore, ease of access to documentation is one of the consideration points for selecting the maturity model. In Gartner's BI Maturity Model, documentation of how to implement it can be obtained at a certain cost, making it difficult for researchers to obtain. Furthermore, the aspects measured in the maturity of BI implementation are taken into consideration. The TDWI model only focuses on technical aspects so that it is also eliminated. Documentation of the application of the biMM model is quite easy to obtain and covers three aspects, namely functionality, technology, and organization so that it is deemed suitable for the purposes of this study.

2.4 Theoretical Model: The Business Intelligence Maturity Model (biMM)

The biMM consists of the three perspectives described previously. Each perspective is made up of dimensions and then broken down into sub-dimensions. The calculation of the maturity level of the implementation of the BI system is calculated

based on the average value of the maturity of the sub-dimensions, dimensions, and perspectives. By looking at each maturity value starting from the sub-dimensions, dimensions, perspectives, and finally the overall maturity level of the BI system, we can provide an overview of which parts still have a low level of maturity [1], [22]. The method will determine which maturity level that the organization achieves. The stage is First stage: individual information, Second stage: information islands, Third stage: information integration, Fourth stage: information intelligence, Fifth stage: enterprise information management.

2.5 Research Instruments

A total of 22-items has been designed in the questionnaire as this study research instruments. It is used to test the respondents regarding functionality, technology and organization perspective then check the overall maturity level. Table 2 explains the 22 items in detail, in matter of question composition for each perspective and sub dimension of biMM. The questionnaire consists of closed questions and contains comparison stage for all sub dimension in all perspectives, then will be converted to 1-5 scale, to enable automated analyses and reporting.

Table 2. Detail Question for Perspective and Dimension

Perspective	Dimension
Functionality perspective (6 questions)	Scope (2 questions)
	Data architecture (2 questions)
	Penetration level (2 questions)
Technology perspective (8 questions)	Technical architecture (3 questions)
	Data management (2 questions)
	Information designs (3 questions)
Organization perspective (8 questions)	Organization structure (3 questions)
	Processes (2 questions)
	Profitability (2 questions)
	Strategy (1 question)

2.6 Data Collection Procedures

We sent questionnaires to people in organizations with different backgrounds. A total of 40 subject matter experts (SME) are being the samples of this research. Those 40 SMEs represent business users which are analysts that have already been using BI system for the last two years, IT strategic group SME who maintain roadmap for the company, and BI Operational Team SME. The questionnaire was sent out by e-mail and/or online form. The period of questionnaire fulfilment is between 15-23 Dec 2020. From the questionnaires that were sent out to 40 SMEs, a total of 24 questionnaires successfully collected.

2.7 Data Analysis Technique

We use Microsoft Excel spreadsheet to analyze the data that has been collected. Each question on the questionnaire is then mapped to the biMM framework, then researcher calculates the average point for sub dimension maturity level. Then the maturity level of sub dimension used to determine the maturity level per perspective. The result of organization BI Maturity Level is determined by combining the three perspectives (functionality, technology, and organization) to get current maturity level (1, 2, 3, 4, or 5).

3. RESULT AND DISCUSSIONS

In this section an analysis and discussion of research results will be carried out based on three perspectives, namely functionality maturity, technology, and organization.

3.1 Functionality Maturity Perspective

The functionality maturity perspective consists of 3 dimensions, namely scope, data architecture, and penetration level. The scope dimension will measure the maturity level of the use of BI solutions by various users and support from relevant application areas and business processes. The dimension of the data architecture will measure the maturity level

of providing a reliable, consistent, and adequate information base for analysis in accordance with predetermined use cases. The penetration level dimension will measure the maturity level of the integration of analytical information provided to support decision making in business processes.

Scope: The scope consists of (1) BI systems usage in the organization and (2) the BI system coverage. In general, the results show that the BI system is not used in all divisions in the company, most of its use is only in certain groups. This is in line with the distribution of BI system users in 5 divisions only certain groups use them and are still using them in small amounts of users. Only in the After Sales and Sales & Marketing divisions, where the BI system is evenly used in each group. For BI system coverage, majority of respondents acknowledged that the current BI system has the value of access to various data sources and integration with several relevant business processes to analyze business conditions at the company, replacing manual reporting and analysis activities with automated processes.

Data Architecture: The data architecture consists of (1) Content consolidation and (2) Business data management. The key roles of content consolidation and business data management are to avoid content redundancies so that overlapping analytical content does not occur within the company, maintain information quality and semantic consistency across the company (understanding of key business-related terminology), and manage the collection of company data that is clear, comprehensive, and complete from existing data sources both internal and external. Based on the results of the questionnaire, it can be concluded that currently the company has the same understanding of business semantics and good data consolidation at the group level and only a few divisions have good enough data consolidation (Sales & After Sales). With a large organizational structure consisting of 9 divisions and 15 groups, as well as various data sources owned by the company and still silo in nature, there will be isolated management of business data in each application system or group. However, with a centralized business data management approach, currently the company is working on collecting complete company data sourced from company systems as well as additional external data, then minimizing the overlap of analysis content within the company. This is consistent with the maturity characteristics of level 3, namely the single version of truth is consistently pursued within the company.

Penetration Level: The penetration level consists of the (1) Impact of BI in the organization, and (2) Use of synergy between BI system and needs in the organization. Based on interviews, it is known that the impact of the BI system on companies was initially underestimated. However, over time it can help the reporting process within the company so that it can be relied upon and used for decision making. In addition, currently the BI system is being promoted in the company due to its capability to create its own reports using BI tool which is free to use. In synergy, the use of the BI system has been good. With a BI system, users can check current business conditions directly, access data for download and then reprocess it. Several things need to be improved in technical terms such as the availability of data that is close to real-time, minimizing bugs in the data warehouse/DWH, improving data quality, and increasing education for users so that manual things can be turned into automatic ones through digital transformation.

Table 3 provides a summary of the functionality maturity perspective. By looking at table 3, we can conclude that on average the maturity perspective of functionality is at level 3. However, the content consolidation still requires improvement due to the value is lower than the other sub-dimensions.

Table 3. F unctionality maturity perspective result

Design object	Overall maturity level				
	One	Two	Three	Four	Five
Scope					
Use			x		
Diffusion in application areas and business processes			x		
Data Architecture					
Content consolidation		x			
Business data management			x		
Penetration level					
Impact of BI		x			
Use of synergies		x			

3.2 Technology Maturity Perspective

The technological perspective consists of 3 dimensions, namely technical architecture, data management, and information design. Technical architecture dimensions will measure the level of interaction maturity and efficient design of technical components and tools in the BI landscape. Data management dimension will measure the maturity level of data management and integration, data quality, metadata, and master data management as well as BI design. The Information design dimension will measure the maturity level of reporting capabilities in applications, analysis functions, as well as distribution channels and formats supported by the BI system.

Technical Architecture: Technical architecture consist of (1) architecture of data storage used for analysis and reporting, (2) utilization of data analysis tools, (3) the link between BI tools and integration with operational processes. Regarding the technical architecture, the majority of users stated that currently there is a dedicated repository for storing application data in multiple data warehouses, with aligned data mart domains. This is in accordance with the observations made by the author in this study and obtained data storage methods using a federated database scheme. Based on the results of the interviews, all interview respondents said that they generally know about data storage in the BI system, the process of extracting data from sources and storing it in the data warehouse. Regarding the use of software for data analysis within the company, it was conveyed that currently there are still some users who use Excel to process data for the purpose of providing reports. However, some users who do have basic IT tools can retrieve data directly from the data warehouse and then perform data analysis. According to IT Planning staff, the tools used are tailored to the needs and capabilities of users in the company. Analysis tools have been provided to help facilitate data analysis. For the integration of BI systems with operational data analysis, currently it is considered good enough because the IT team conducts periodic reviews with business users even though not all business processes are accommodated in scope.

Data Management: Data management consists of (1) data integration, and (2) quality management within the organizations. According to the results of the author's observations at the companies in this study, the characteristics of level 3 Information Integration in terms of stabilization through automated data management and Data Quality Management (DQM) tools, use of metadata repositories with a focus on technical metadata, and centralized administration of important master data in BI systems not done. This happens due to a lack of knowledge in the DQM domain, metadata management, and master data management. This is evidenced by the absence of a detailed data organization definition, so that the roles that play an important role in DQM, metadata management, and master data management are not clearly known within the company. There is no documentation that regulates the expectations for the quality of data stored in the data warehouse, and there are many versions of the master data, which are made depending on the requests of business users.

Information Design: Information design consists of (1) analysis functionality in the organization, (2) report generation, and (3) access to analytical information. Currently, the BI system is used to view data on an ad-hoc basis and perform analysis, as well as carry out planning manually after data analysis has been carried out. Due to the uncertain time in terms of user access to the BI system, it results in usage problems, namely low access to the BI system and the use of purchased application licenses is not optimal. The BI system has not been able to make users regularly view the reports provided or use the warning, forecasting and predictive analysis features in it. Regarding the reporting capabilities of applications and information dissemination channels, users have a fairly uniform understanding that reports will automatically exist in the BI system and can be accessed via a web browser, file sharing / data portal.

Table 4 provides a summary of the technology maturity perspective. By looking at table 4, we can conclude that on average the maturity perspective of functionality is at level 4. However, the technical data management still requires improvement due to the value is lower than the other sub-dimensions.

Table 4. T echnology maturity perspective result

Design object	Overall maturity level				
	One	Two	Three	Four	Five
Technical architecture					
Architecture				x	
Utilization of tools				x	
Integration of/with operational process				x	
Data management					
Data integration			x		
Technical data management		x			
Information design					
Analysis functionality			x		
Reporting		x			
Information channels			x		

3.3 Organization Maturity Perspective

The organization perspective consists of 3 dimensions, namely organizational structure, processes, profitability, and strategy. Organizational structure dimensions will measure the maturity level of BI governance, BI management organizations, and rules related to data ownership. Process dimension will measure the maturity level of process design for BI system operations as well as the definition and coordination of service request processes related to the BI system. Profit measurement dimension will measure the level of maturity related to how an organization measures the benefits of using a BI system and ensures an efficient and effective allocation of the necessary costs (especially employees, licenses, hardware) for the development and operation of BI applications. BI strategy dimension will measure the level of maturity related to the strategic orientation of BI system implementation.

Organization Structure: BI Organization Structure consists of (1) BI governance, (2) BI organizational structure. and (3) Data ownership. Governance is known to be quite even because every year a Focus Group Discussion (FGD) is held which discusses the needs of all applications and specifically the needs related to the BI system. Then the result of the FGD is an IT Roadmap which will be executed in the following year. The average BI system user already knows the organizational structure and how to convey needs or incidents that occur in the BI system. Users will submit complaints or needs to the IT Group team, and on several occasions can directly submit them to the IT Helpdesk, then the IT Helpdesk team will record and make tickets to the BI Managed Service Team. Through interviews, the authors obtained information that written regulations governing all data ownership currently exist, namely the IT Data Policy document. The IT Data Policy document regulates the business user role in a system, what can do, see what, and regulates data retention for how long, what can be seen by IT vendors and data confidentiality rules. In addition, the company has Standard Operating Procedures (SOP) that regulate its business processes. Intuitively, at the organizational level, they already understand which part of the data currently belongs to which refers to the SOP owned by the company.

Processes: The processes item consists of (1) Standards for handling BI request and (2) BI availability. Users already know the procedure for submitting needs and complaints. However, the user submits to the IT department regarding the service level agreement or service level agreement. This is in line with the results of interviews and documentation searches, as conveyed by the IT staff, usually the user will send a request to the IT team. Then the IT team will analyze these needs and prioritize which one is more important. Next, it will be submitted to the BI operational team to create a dashboard regarding new report requests. For existing reports, users will usually contact the IT Helpdesk team or the BI operational team directly. Regarding service availability, at the beginning of operations, the knowledge of the BI system operational team was still not ready because the BI system was something new in the company. Problems often occur in the BI system services that cause user complaints. Then an increase in Service Level management was carried out, as well as the BI system infrastructure design was changed several times due to increased knowledge from the operational team.

Profitability: Profitability consists of (1) Profitability calculations and (2) Cost allocation. Through interviews, IT staff said that currently the IT team is analyzing the number of users accessing the dashboard in the BI system as a measure of

profit. In addition, based on the results of observations, an evaluation of BI System services is carried out every year. The evaluation comprehensively conveys the achievement of service availability, the success rate of handling service requests, the number of service requests, the level of customer satisfaction, complaints from users, evaluation of cooperation agreements, and analysis of budget absorption.

BI Strategy: FGDs have been conducted to gather the needs of both tactical and strategic users. Then it is stated in the IT Roadmap. Through interviews, according to IT staff, there is currently a roadmap for all systems in the company, including the BI system, so it is clear in the future which way the BI system will be integrated. In addition, a campaign or socialization is currently being carried out to all business teams regarding the advantages of using the BI system and training is being carried out through the BI University so that the use of the BI system independently can be carried out. The After Sales Planning staff added that usually at the end of the year a process of summarizing what will be improved next year will be carried out. Then the IT team and vendors mapped it and calculated how much the overall costs would be for the initiatives to be carried out. If it is in accordance with the budget owned by the company, it will continue to work on the project, but if it is too large the cost will be stopped before fulfilling its needs.

Table 5 provides a summary of the organization maturity perspective. By looking at table 5, we can conclude that on average the maturity perspective of functionality is at level 3. However, the availability still requires improvement due to the value is lower than the other sub-dimensions.

Table 5. O rganization maturity perspective result

Design object	Overall maturity level				
	One	Two	Three	Four	Five
Organizational structure					
BI governance				x	
BI organizational structure			x		
Data ownership			x		
Processes					
Processes			x		
Availability		x			
Profitability					
Profitability calculations			x		
Cost allocation			x		
Strategy					
BI strategy				x	

3.4 Maturity Score Summary

From 24 participants that fill the questionnaire, we already summarized the quantitative result for easy understanding of data. The summary quantitative result, that we call Maturity Score, can be seen on Table 6. And the radar chart is added for quick check which sub-dimension that have low maturity level (Figure 1).
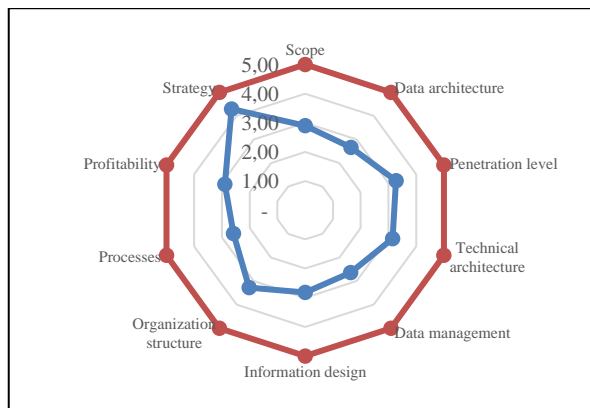

Figure 1. Radar Chart - Maturity Score

Table 6. Maturity Score Summary

Perspective	Dimension	Maturity Score
Functionality perspective	Scope	2.90
	Data architecture	2.67
	Penetration level	3.27
Technology perspective	Technical architecture	3.15
	Data management	2.65
	Information designs	2.82
Organization perspective	Organization structure	3.28
	Processes	2.58
	Profitability	2.90
	Strategy	4.29
Average		3.05

3.5 Recommendations

From point D, we can see in high level overview that sub-dimension consolidation content, technical data management, and availability have the lowest maturity score. Below is the recommendation for improve sub-dimension that still have low maturity score than the others to reach maturity score 3 at minimum:

• Regarding the Content Consolidation sub-dimensional, the authors suggest that the IT team initiate the implementation of Data Governance by referring to existing best practices such as the Data Management Body of Knowledge (DMBOK). So that important roles in content consolidation can be available within the organization, such as the roles of the Chief Data Officer, Data Governance Steering Committee, Data Governance Council (DGC), and Data Stewardship Teams. By having important roles in data management available, companies can avoid content redundancies that lead to overlapping analysis content, maintain information quality and semantic consistency throughout the company (understanding of key business-related terminology), and manage the collection of company data that is clear, comprehensive and complete from existing data sources both internal and external. Once this is done, the company can continue to focus on improving technical data management.

• Regarding the Data Management Technical sub-dimension, companies through their IT team can create SOPs to carry out data projects that regulate the use of metadata repositories with a focus on technical metadata, carry out the concept of master data management in all data projects, and require an initial assessment of a quality expectation. data to be displayed in the report. In addition, the company's IT team can urge vendors who provide BI system operational services to increase knowledge in the domain of metadata management, master data management, and data quality management. By implementing these recommendations, problems with data integration, data quality, metadata, and master data management can be resolved. It is also expected that user trust will increase so that the scope of the BI system becomes wider within the organization.

• Regarding the Service Availability sub-dimension, the company's IT team can conduct periodic evaluations regarding the utilization of resources, both hardware and software, as well as human resources that support the operation of the BI system. Hardware evaluation is carried out by periodically checking whether the provided CPU, memory, and storage can still support the running of the BI system or need to be added. Software evaluation is carried out with periodic evaluations and discussions with BI system operational service provider vendors regarding the required software so that costs can be allocated to ensure better service availability. On the human resources side, the IT team can carry out a workload analysis of the BI system operational team so that it can be concluded whether additional human resources are needed or can it still run well with the current number. In the end, the IT team can re-socialize to increase user awareness regarding the availability of BI system services.

4. CONCLUSION

The conclusion that can be drawn from this research is the BI maturity level on the one of Indonesian automotive company is at level 3: Information integration. On the third maturity level, has the characteristics of extensive use of analytical information provided by BI systems for analysis of relevant business processes within the company, use of data warehouses for cross-divisional data harmonization, automated data provisioning, and obtaining BI initiatives aligned with the IT team's strategy. Technology maturity is on the lowest point with an average of 2.87 point, Functionality is in the middle with 2.94 point, and Organization have highest point with 3.26 point. The company can improve on SLA Awareness, Data Management, and Data Architecture while retaining the performance of BI Strategy & BI Governance.

For the future study, after the recommendation above is implemented, we can periodically check the maturity level of BI in the company and start to define internally which maturity level for each sub-dimension or perspective that the company want to achieve. This study can be enhanced further in subsequent research that span multiple companies in a single industry or multiple industry to get more applicable conclusion across companies or industries.

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