

Cukur361 Mobile Application Design for SME using Hadoop FrameworkEdward Chandra¹, Pangondian Prederikus², Stefanie Liu³, Gunawan Wang⁴Information System Management Department, BINUS Graduated Program – Master of Information Systems Management, Bina Nusantara University, Jakarta, Indonesia, 11480. e-mail: ¹edward.chandra003@binus.ac.id.²pangondian.prederikus001@binus.ac.id; ³stefanie.liu@binus.ac.id; ⁴gwang@binus.edu**ABSTRACT**

SME is a large contributor in Indonesian finance and has now received digitalization. Unfortunately, it is still lack of the ability to utilize technology and managerial skills. This article will explain the design of mobile applications for SMEs that are supported by augmented reality technology and will be further examined through the Hadoop framework. With Big Data, business owners will be better able to cope with markets, consumer interactions, so they can create products that are in accordance with market wants.

Key words: Augmented reality, Big Data, Hadoop, mobile application, SME

1. INTRODUCTION

Kemenkop released the number of business units in Indonesia as of 2017 was 62,928,077 units. 62,922,617 business units are MSMEs (Micro, Small and Medium Enterprises), and the rest are large businesses. In 2018, the MSME sector contributed 8,400 trillion rupiah to Indonesia's Gross Domestic Product (GDP). This figure is equivalent to 60% of the IDR 14,000 trillion of Indonesian GDP in 2018. Micro Business absorbs around 107.2 million workers (89.2%), Small Business 5.7 million (4.74%), and Medium Business 3, 73 million (3.11%); while Large Enterprises absorbed around 3.58 million people. MSMEs proved to be successful in passing the economic crisis in 1997-1998 and 2008-2009. This success was supported by several factors, including not large capital, minimal dependence on imports of raw materials, and not affected by fluctuations in foreign exchange rates.

Industry in the service sector is one of the business sectors that is currently developing at MSMEs. Along with the development of technology, business development in the industry sector is currently increasing on the innovation side of the business. The needs of human life that lead to practical and fast-paced needs, make business services grow more innovative. On the other hand, weaknesses exacerbated by MSME entrepreneurs include the number of capitals both in number and source, managerial ability and skills in organizing and limited marketing. Besides these, there is also unfair competition and economic pressure so that the transition space needed is limited and limited.

Support from the Indonesian government was realized through the digitization movement of MSMEs so that MSMEs became online. However, the ability and knowledge of MSMEs that are still low to utilize technology and information causes marketing to still be local and the target market to be limited. In fact, the data collected in the digital platform should be able to be processed to find out which products are liked by consumers, so as to avoid the creation of products that are not liked by consumers. In addition, the utilization of data collected in a digital platform can predict sales trends and consumer tastes.

Barbershop in Indonesia is one of the most rapidly growing SMES since 2016. In 2017, the Barbershop Association of Indonesia noted that it has spread over 5,000 Barbershop units throughout Indonesia. The rapid development is supported by the collapse of old barbershop business and the awareness of men to look attractive. This article will discuss the digital platform design in the form of websites and mobile application called Cukur361. Hopefully through this application, businesses can increase their sales through broader market outreach.

2. LITERATURE REVIEW**2.1 MSMEs**

MSMEs is an independent business that is carried out independently by individuals or business entities in all economic sectors (Tambunan, 2012:2). SMEs are divided into micro, small and medium enterprises with the following definitions:

- According to UU RI No. 20 Year 2008 (Indonesia's Law No. 20 Year 2008), Micro Enterprise is a productive business belonging to individual person and/or individual business entity that meets the criteria of micro enterprise as stipulated in this Law and micro enterprises have criteria that are:
 - It has a net worth⁴ at most Rp 50.000.000, 00 (fifty million Rupiah) excluding land and business premises or;
 - The annual sales result is at most Rp 300.000.000, 00 (three hundred million rupiah).
- According to UU RI No. 20 Year 2008 (Indonesia's Law No. 20 Year 2008), Small business is a

standalone productive economic business, conducted by an individual or business entity that is not a subsidiary or non-company branch owned, mastered, or becomes Either directly or indirectly from the medium enterprises or large enterprises that meet the small business criteria as referred to in this law and have the criteria are:

- Has a net worth more than Rp 50.000.000, 00 (fifty million rupiah) to at most Rp 500.000.000, 00 (five hundred million rupiah) excluding land and business premises or;
 - It has an annual sales of more than Rp 300.000.000, 00 (three hundred million rupiahs) to at most Rp 2.500.000.000, 00 (two billion five hundred million rupiahs).
- According to UU RI No. 20 Year 2008 (Indonesia's Law No. 20 Year 2008), Medium Enterprises is a standalone productive economic business, conducted by an individual or business entity that is not a subsidiary or company branch owned, mastered, or part Either directly or indirectly with small business or large enterprises with the amount of net worth or annual sales proceeds as stipulated in this law and have the criteria are:
 - Has a net worth more than Rp 500.000.000, 00 (five hundred million rupiahs) to at most Rp 10.000.000.000, 00 (ten billion Rupiah) excluding land and business premises or;
 - It has an annual sales of more than Rp 2.500.000.000, 00 (two billion five hundred million rupiahs) to at most Rp 50.000.000.000, 00 (fifty billion rupiah).

Table 1: MSMEs and Large Enterprises Criteria

| No. | Size Of Businesses | Criteria (In Rupiah) | |
|-----|--------------------|---|---------------------------|
| | | Assets (excluding land and business premises) | Turnover (in 1 year) |
| 1. | Micro | Max. 50 Million | Max 300 Million |
| 2. | Small | 50 – 500 Million | 300 Million – 2,5 Billion |
| 3. | Medium | 500 Million – 10 Billion | 2,5 Billion – 50 Billion |
| 4. | Large | More than 10 Billion | More than 50 Billion |

2.2 Big Data

Big data according to oracle.com is an asset or collection of information that has a high volume, high speed and has a variety that demands the cost of processing innovative information that is effective, increases insight, helps in decision making and automation processes. In the Oxford Economic Survey of 2013, Technology and innovation are important strategies in the development of SME (Small-Medium Enterprise), and Big Data is considered as one of the main drivers. Big Data usage in MSMEs is expected to encourage cost efficiency, improve product/service development, better customer service, improve innovation and optimize supply chain.

Sen et al. (2016) stated that Big Data enabled SMES to be able to realize new things about their systems by analyzing data and demonstrating correlation, risk, opportunities they had previously not noticed. It can therefore also improve the decision-making system. In addition, it can also assist SMES in diverse business scenarios where it will improve the quality of products or services today or SMES can create new products or services.

Ogbuokiri et al. (2015) stated that there are 3 characteristics in Big Data solution that is worth noting by SMEs namely Flexibility and choice, Simplicity and cost.

Based on news from Suara.com, the Ralali.com startup company helped to advance SMES by utilizing Big Data. Chief Officer, Head of Growth and Expansion Ralali.com, Chandra Tandiono suggested that the local government (PEMDA) in Indonesia began collecting MSME-related data in its region and using big data analysis. Chandra also states that collected data should be processed and analyzed using Big Data. Data collected is data type of transaction, operation, production, service, to funding.

2.3 Augmented Reality

Augmented reality (AR) is a technology that dynamically combines real-world environments and technology-based information (Azuma, 1997). Augmented Reality creates a direct or indirect interaction of the physical world environment and has been added information generated by virtual computers. Augmented Reality is divided into types of interactive technologies that are registered in 3D and combine real and virtual objects.

Based on data from the Research institute Report Linker, the market for AR & VR will grow with an average annual growth of 41.2% during 2016-2025 period. So based on these data it can be concluded that by 2025, the AR & VR Technology Market will reach \$ 130.01 billion.

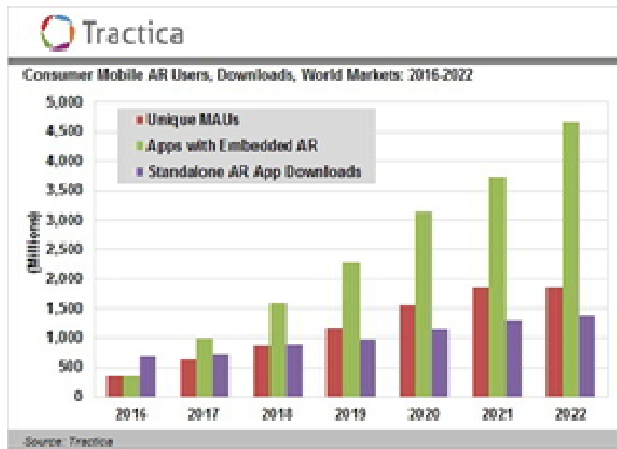


Figure 1: Consumer Mobile AR User, Downloads, World Market: 2016-2022

Based on the data above, the use of AR will also be more widespread and applied in various fields in line with the development of the market throughout the year 2019. AR technology will be a mobile capability that is increasingly embedded in smartphones and other platforms. AR technology will also be embedded in social media platforms, e-commerce, business applications, gaming and entertainment, indoor mapping/navigation, as well as four use cases for companies/institutions (education, plant maintenance, field services, and B2B sales tools).

Ekren et al (2017) said that SMEs have the potential to be able to cope with the industry 4.0 (cost reduction, increased efficiency, and more business) ', but also the lack of adoption of emerging technologies for implementation and application. AR technology will help and improve the company's performance to visualize data in the product in detail which can later be used as a simulator tool and useful in decision making for the company. The increase can help in several aspects of the value chain such as marketing to manufacturing and construction, operations, and maintenance.

2.4 Hadoop

Hadoop is a framework software that allows large amounts of data to be distributed by involving multiple clusters of computers/computers in bulk. Hadoop is designed with the goal of being able to work effectively on the smallest scale involving only one server to a large-scale involving thousands of computers where each computer has a local computing and data storage facility.

In achieving High Availability, Hadoop does not rely on the hardware used, but the HADOOP framework itself has been designed to be able to detect and handle failure functions at the application level/layer. Hadoop will divide the computing process on other computers without much overlap so that the results become faster. The more computers are connected, the quicker it will be to process the calculations. The data will be distributed to all existing computers, and if there are any problems on certain computers the data will be kept intact.

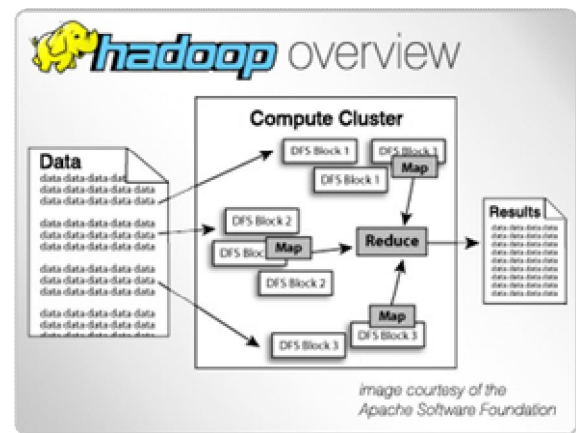


Figure 3: Hadoop Overview

Hadoop itself is an ecosystem consisting of open source components that fundamentally change the way companies store, process, and analyze data. Unlike traditional systems, Hadoop allows many types of analytic workloads to run on the same data, at the same time, on a large scale on industry-standard hardware. The Hadoop ecosystem is described in Figure 2.4.2 below.

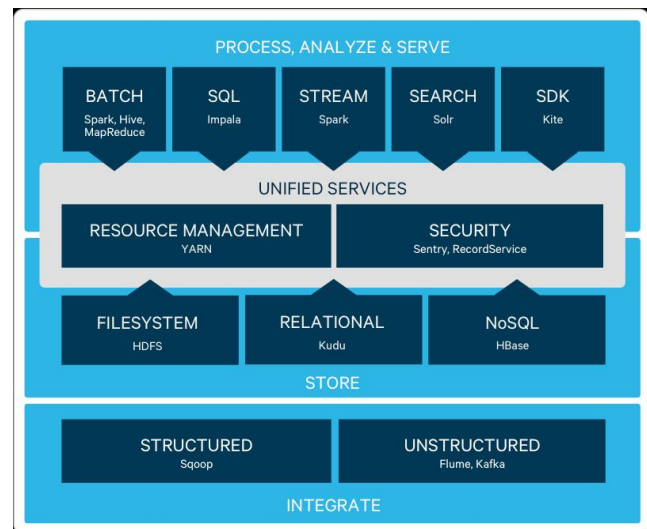


Figure 3: Hadoop Ecosystem

3. RESEARCH METHODS

In this section contains a framework of thoughts and methods used in research based on literature and journals relating to the design of mobile applications by using the Hadoop Framework on Cukur361. The discussion of the mindset is explained in the following sub-chapters.

3.1 Framework Used

The application of big data through the Hadoop framework requires several stages in its implementation. Starting from the analysis phase of IT system is by processing and designing

the Cukur361 application. This study was conducted with the following methodology approach:

- The study of the library of Big Data processing technology Hadoop, and the sharing of current Hadoop technology experience by Google, Facebook, Twitter.
- Exploration of Hadoop technology, by setting up a Hadoop environment and its derivative technology.
- Development of DNA patterns implementation, which begins with developing a pattern of adoption of HADOOP technology in community-based applications.
- Analysis of results and conclusions

4. RESULTS AND DISCUSSION

4.1 Cukur361 Workflow



Figure 4: Cukur361 Workflow

Customers who intend to use the application must register a Login ID and personal data. Orders for hair shaving services will then be forwarded to the admin, and a queue number is created. After the customer receives a hair shaving service, the customer will reconfirm the data and order before making a payment.

4.2 Application Features and Big Data Utilization

a. Online Registration Feature

By using Big Data, business owners will be able to observe what age categories are potential customers. This is expected to help business owners create haircuts that are suitable for potential customers.

b. Online Map Feature

This feature makes it easy for consumers to find the barbershops' location, but with the use of Big Data, business owners are also expected to be able to observe more broadly which areas are not yet reached by their businesses.

c. On-Demand Service Feature

This feature allows customers to select the Kapster before arriving at the barbershop, and it also provides a selection of arrival Kapster to the customer's location. With the utilization of Big Data, it is hoped that business owners can understand the needs of the market, whether consumers prefer to come to the location or vice versa.

d. Online Booking Feature

Customers will get convenience without having to queue on site through this feature, but Big Data will help analyze the work speed of a kapster. It can be used to develop the working ability of the kapster. In this feature, business owners will also be able to see when the peak hour of their efforts are, and the chances of what makes consumers cancel their queues.

e. Live Chat Feature

In this feature, customers can communicate with the admin and the captain. In addition to discussing queues, haircuts, there will be potential consumers asking for additional services, such as cream baths. This discussion when analyzed will produce additional products in the barbershop business.

f. Haircut Suggestion and Try-On Feature

In this feature, several hair models will be available which can be tried with supported by augmented reality technology making it easier for consumers to visualize the desired haircut model. The results of the trial can also be shared with friends of application users.

Big Data will help analyze the most favored hairstyles for consumers, while shared results will also help promote barbershop.

g. Rating and Review Feature

This feature allows the consumer to rate the work of the Kapster. Considering that business owners are not always in the location, Big Data will help business owners assess their employees, for example those with bad ratings, they need to immediately provide further coaching.

h. Coupon Feature

Users can enter the promo code during payment. Big Data will help business owners analyze which promotions are the most successful, for example, better understanding whether consumers prefer discounts or cashback, which payment methods are most used by consumers.

i. Rewards Feature

Customers will earn points every hair shaving through the Cukur361 app. The points will then be used for discounts when re-doing haircut. This feature allows business owners to analyze the most loyal customers and increase future promotions to reach other consumers.

j. Monthly Report Feature

This feature will present financial statements so that they are expected to help improve MSME managerial skills. The presence of this feature in mobile applications so that business owners can monitor the business despite being not on site, while through the website, financial reports can be exported into Microsoft Excel.

k. Cashless Payment Feature

In addition to improving customer convenience in making payments, this feature also supports the cashless movement that is being encouraged by the government. This feature also increases security for business owners, given the potential of robbery in MSMEs.

4.3 HADOOP and HADOOP Ecosystem

Hadoop is an open source Java framework that has an Apache license to support applications that run on big data. Hadoop runs in an environment that provides distributed storage and computerization for each cluster of each node. The file system distribution and computing distribution also runs on the hardware used on Cukur361.

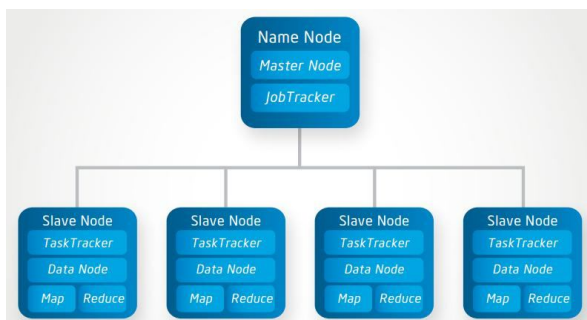


Figure 5: Hadoop Architecture

Hadoop consists of 2 nodes, namely Master Node which contains HDFS Master and MapReduce Master. The HDFS master is responsible for managing the storage partition on the slave node and dividing the data and track access of the data to the slave node. The master functions as a provider of information to the client about the existence of data in the slave node. In this case the master functions as a provider of information to the client about the existence of real data in the

slave node. The Map Reduce Master is also responsible for organizing where the computing work is on the slave node. Slave node is responsible for storing data and running processes that have been scheduled by the master node. Storage and computational capabilities are done by adding slave nodes.

4.4 HADOOP Adoption on CUKUR361

Hadoop technology in online booking Cukur361 is a data transaction application. Therefore, it follows the HBase pattern. Following is the initial architecture of the Cukur361 application.

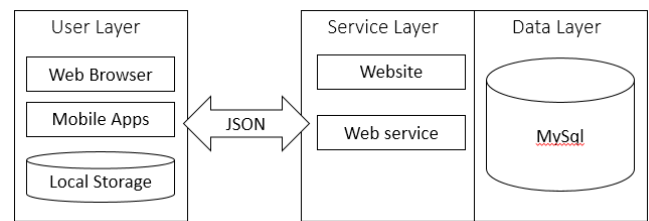


Figure 6: Cukur361 Application Architecture

In the user layer column, there are 2 applications namely Website and mobile apps to access the Cukur361 app. This application also uses local SQLite data to access the data. Transaction data that is displayed is data that is on-premises before synchronizing to the server. At the service layer there is a website for browsers and web services to serve Mobile Apps access through web service (JSON). The service layer will then access the system in MySQL data residing in the data layer.

Adoption of Hadoop especially HBase in shaving applications 361 is done by changing the architecture as in Figure 7 below.

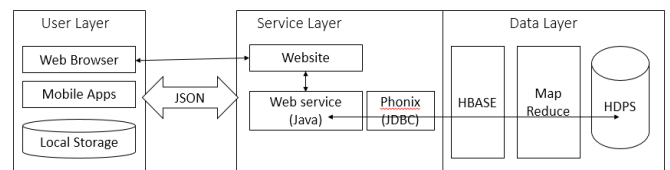
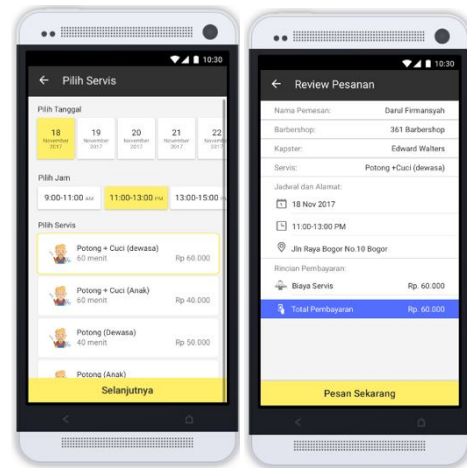


Figure 7: Cukur361 Application Architecture with Hadoop and HBase

The architecture in the User layer appears unchanged, while significant changes are in the Data layer and Service layer. The MySQL data layer is replaced with the Hadoop Ecosystem which is HBase which runs on HDFS. To access HBASE the web service (Java) uses the Phoenix library which extends JDBC access to HBase. Thus, the necessary modifications to the web service application are minimal. With Phoenix it is also possible to generate storage structures on HBase by using SQL DDL which previously only used MySQL. On the website, to get to HBase media is needed, namely web service.

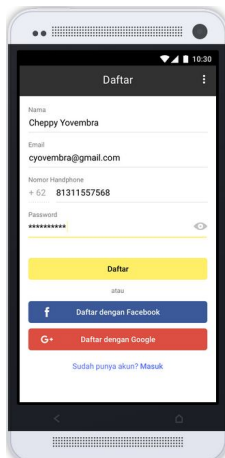
4.5 Advantages of Big Data on CUKUR361

With Big Data, business owners will find it easier to understand consumers more deeply so that business owners can develop effective business strategies. Unlike conventional businesses, data collection and processing are still done manually, so that it still misses business opportunities that are not analyzed thoroughly. Information obtained through the results of Big Data processing will also enable business owners to improve the quality and variety of their products and services in order to create added value. Big Data also allows business owners to expand their market reach, for example by opening a new barbershop location.

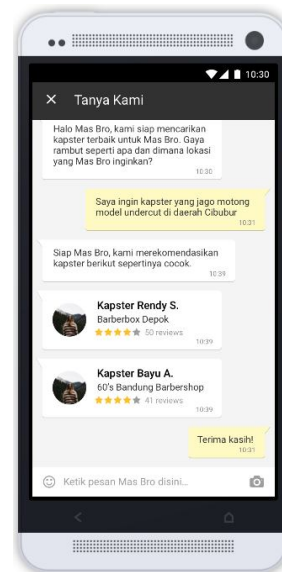


Appendix 3: Online Booking process

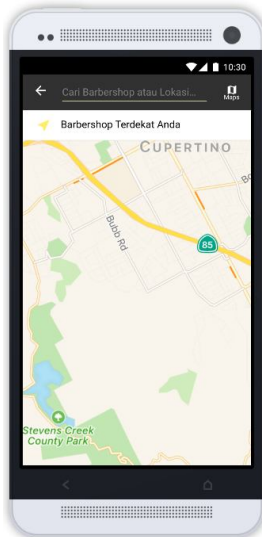
APPENDIX



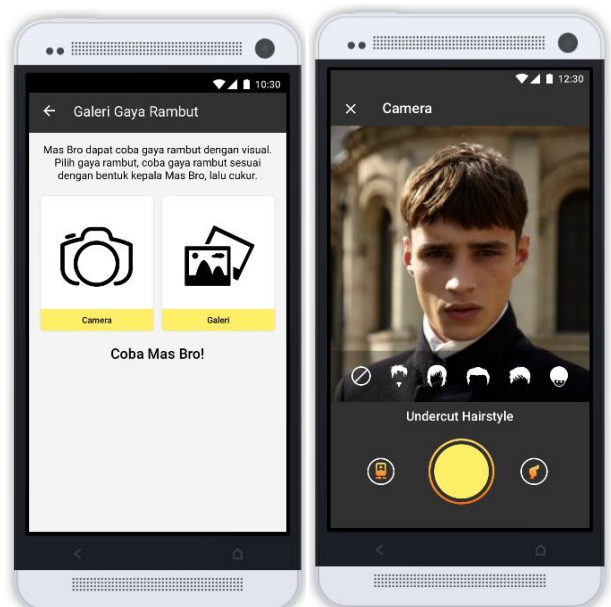
Appendix 1: Sign Up Process



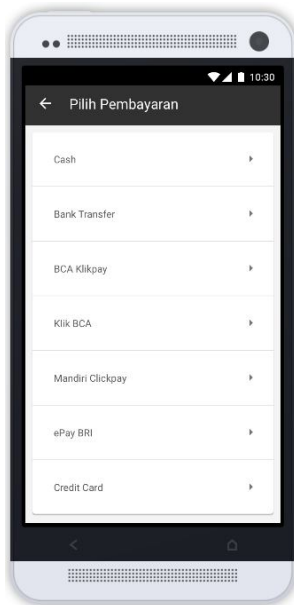
Appendix 4: Live Chat



Appendix 2: Online Map



Appendix 5: Haircut Suggestion and Try-On Feature



Appendix 6: Cashless payment feature

REFERENCES

- Ananta, Y. **Baru 14% dari 58 Juta UMKM RI yang Masuk e-Commerce, Kenapa?** CNBC Indonesia. Retrieved from <https://www.cnbcindonesia.com/tech/20190701123829-37-81831/baru-14-dari-58-juta-umkm-ri-yang-masuk-e-commerce-kenapa>. July 1st 2019.
- Aribawa, D. **PENGARUH LITERASI KEUANGAN TERHADAP KINERJA DAN KEBERLANGSUNGAN UMKM DI JAWA TENGAH.** *Jurnal Siasat Bisnis*, 20, 1–13, 2016. <https://doi.org/10.20885/jsb.vol20.iss1.art1>
- Big Data.** Retrieved from <https://www.gartner.com/en/information-technology/glossary/big-data>.
- Coleman, S., Göb, R., Manco, G., Pievatolo, A., Tort-Martorell, X., and Reis, M. S. **How Can SMEs Benefit from Big Data? Challenges and a Path Forward.** *Quality and Reliability Engineering International*, 32(6), 2151–2164. doi:10.1002/qre.2008, 2016. <https://doi.org/10.1002/qre.2008>
- Ekren, G., Oberer, B., and Erkollar, A. **AUGMENTED REALITY IN INDUSTRY 4.0: ENABLING TECHNOLOGIES AND THE POTENTIAL FOR SMEs.** *International Symposium on Production Research 2017*, pp. 0-10, September 2017.
- Furht, B. **Handbook of Augmented Reality.** Boca Raton, Florida: Springer, 2011.
- Haryanti, D. M., and Hidayah, I. **Potret UMKM Indonesia: Si Kecil yang Berperan Besar.** *UKM Indonesia.* Retrieved from <https://www.ukmindonesia.id/baca-artikel/62>, July 2019. <https://doi.org/10.1007/978-1-4614-0064-6>
- Kementerian Koperasi dan Usaha Kecil dan Menengah Republik Indonesia. **PERKEMBANGAN DATA USAHA MIKRO, KECIL, MENENGAH (UMKM) DAN USAHA BESAR (UB) TAHUN 2016 - 2017.** Retrieved from [http://www.depkop.go.id/uploads/laporan/1549946778_UMKM 2016-2017 rev.pdf](http://www.depkop.go.id/uploads/laporan/1549946778_UMKM%202016-2017%20rev.pdf).
- Ogbuokiri, Blessing., Udanor, Collins., and Agu, Monica. **Implementing big data analytics for small and medium enterprise (SME) regional growth.** *IOSR Journal of Computer Engineering (IOSR-JCE)*, Vol. 17, pp 35-43, 10.9790/0661-17643543, November 2015.
- Saputra, A. G. **Pengaruh Kualitas Pelayanan terhadap Kepuasan Pelanggan Studi Kasus di DR. BARBER,** B.D Thesis, Dept. Business Administration, Universitas Telkom, Bandung, Indonesia, 2018.
- Sari, R. P., & Santoso, D. T. **Pengembangan Model Kesiapan UMKM di Era Revolusi Industri 4.0.** *Jurnal Media Teknik & Sistem Industri*, Vol. 3, pp 37–42. Retrieved from <https://jurnal.unsur.ac.id/jmtsi/article/viewFile/561/444>, 2019.
- Sommerauer, P., and Muller, O. **Augmented Reality for Teaching and Learning – A Literature Review on Theoretical and Empirical Foundations.,** *Twenty-Sixth European Conference on Information Systems (ECIS2018)*, pp 1–17, 2018.
- Suci, Y. R. **Perkembangan UMKM (Usaha Mikro Kecil dan Menengah) di Indonesia.,** *Jurnal Ilmiah Cano Ekonomos*, Vol. 6, pp 51–58, 2017.
- What is Big Data? Retrieved from <https://www.oracle.com/big-data/guide/what-is-big-data.html#link1>.
- Pemerintah Indonesia. **Undang-Undang Republik Indonesia Nomor 20 Tahun 2008 Tentang Usaha Mikro, Kecil dan Menengah.** Juli 2008.
- Adelene, E., Singh, G., Malav, A., and Agarawalla, K. **Distributed Database for Water Supply Data Based on Hbase.** *International Journal of Emerging Technologies in Engineering Research (IJETER)*, Vol. 6, Issue. 10, pp 67-69, October 2018.
- Kumar, N. B., and Janaki, E. **Smart Pollution Affected Areas Analysing Technique-A Hadoop Based Approach.** *International Journal of Emerging Technologies in Engineering Research (IJETER)*, Vol. 6, Issue. 9, pp 6-11, September 2018.
- Khan, T.H.F., Adithya, R., Sidharth, C.S., Shyam, T., and Teja, K. **Augmented Reality Based Virtual Cursor and Keyboard.** *International Journal of Emerging Technologies in Engineering Research (IJETER)*, Vol. 6, Issue. 5, pp 41-44, May 2018.