RekaRacana: Jurnal Teknik Sipil
ISSN [e]: 2477-2569 | DOI: https://doi.org/10.26760/rekaracana
Vol. 09 | No. 02 | Hal. 88-99
Juli 2023

Project Communication Management in a Micro Small Medium Enterprises (MSMES) in a Construction Project

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ABSTRACT

Micro, small, and medium enterprises (MSMEs) have become Indonesia's most essential and strategically important national economic drivers. This research focuses on an MSME involved in a construction project in 2021. This research aims to shed light on the project communication management of an MSME organization, PT Nata Kota Nusantara, simply Natakota, a micro-scale enterprise based in Bogor. Natakota was engaged in a civil construction project in a remote site area at PT GDE (GDE) in Ciwidey, Bandung. GDE is a state-owned enterprise focusing on geothermal energy and power generation. Virtual ethnography, observation, and discourse analysis were performed to reveal the project communication management process within the organization. It was unveiled that Natakota used Google Spreadsheet as a form of free and open-source software (FOSS) as their primary communication tool during the project execution. Actor-Network Theory (ANT) explains that the actor is the prime entity that shapes, drives, and accelerates the communication process within the network. This research observed the communication and collaboration between employees on several Google Spreadsheet files. In a project execution phase, communication is essential to obtain a productive project. Project communication plays a central part in communicating information flow to execute that project successfully. The results of this research show that several features in Google Spreadsheet play as actors in the ANT framework, which shapes, drives, and accelerates the internal communication process in the organization. Additionally, it appears that Google Spreadsheet could offer a competitive low-cost option for MSMEs looking to manage internal communications effectively and efficiently.

Keywords: *collaboration, communication, MSMEs, organization, project*

1. INTRODUCTION

Micro, small, and medium-sized enterprises (MSMEs) have developed into Indonesia's primary strategic economic powerhouse. MSMEs have recently contributed to the nation's gross domestic product (GDP) economic growth. According to information from the Coordinating Ministry for Economic Affairs, the MSME sector generated 60.5% of the country's GDP in 2022. Additionally, 96.9% of the employment held by Indonesian people is provided by MSME [1]. MSMEs contribute 15.6% of Indonesian exports in the non-oil and gas sector. Micro-scale businesses comprise the vast majority of business sizes in Indonesia, accounting for 99.62% of all business entities, or nearly 64 million [2]. These statistics demonstrate that MSMEs have contributed significantly to Indonesia's recent economic growth.

The industry served by MSMEs ranges from the manufacturing industry, creative industry, construction industry, consultancy industry, engineering industry, and many more. This research focuses on an MSME, PT Nata Kota Nusantara (Natakota), involved in a civil construction project 2021 with a contract value of approximately two billion Indonesian Rupiah. Natakota is a micro-scale enterprise with a head office in Bogor, West Java. The project site is located at PT GDE (GDE). GDE is a government-owned geothermal power plant enterprise in a remote area of the mountainous region Ciwidey, Bandung Regency, West Java. Internet and phone connection were only available at the site office for Natakota's team.

To establish communication and coordination with the head office during the project execution, Natakota's site team spent approximately one hour at the site office. In this project, the management team (e.g., project manager, purchasing supervisor, and finance supervisor) were in Bogor's head office. Natakota's site team comprised a site engineer and a general affair supervisor. During the project execution, Natakota used several internet communication technology (ICT) channels such as Google Spreadsheet, WhatsApp, and Zoom to establish communication and collaboration between these two distant places. These communication channels are classified as free and open-source software (FOSS). FOSS refers to software that can be used for free by its users [3]. In this research, Natakota used Google Spreadsheet, WhatsApp, and Zoom for the free features. Google Spreadsheet can be used if a user has a Google account. WhatsApp group is free to use for all its features.

Regarding the Zoom app, Natakota only uses its free features. It may conclude that Natakota uses these ICTs at competitive prices to run the project. Figure 1 shows the communication process between the Site and the head office team for the mentioned project. In this research, the primary focus of the discussion would be to examine the collaboration and communication in the Google Spreadsheet. This research will not examine the utilization of Zoom and WhatsApp during the project execution.

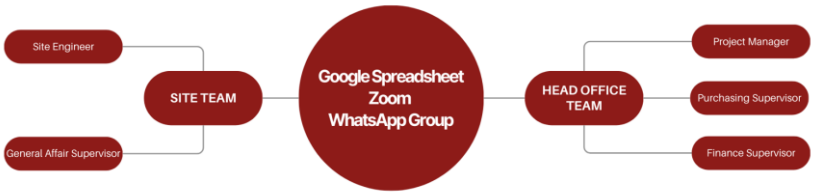

Figure 1. Remote collaboration process in Natakota during the project execution phase

A previous study on project communication in a manufacturing project has shown that FOSS can be a powerful tool for internal collaboration in a large-scale business enterprise [3]. Previous research show that many MSMEs can use FOSS to run their projects for collaboration

and communication [4]. The previous study believes that many MSMEs businesses still need to utilize and maximize digitalization to enhance their communication and collaboration process [5]. [6] state that one of the biggest obstacles in running a project is delivering effective and efficient communication. Lack of communication between parties is one of the ten main reasons projects fail [6]. Ensuring that project communications management procedures in the construction sector adapt in response to new requirements and improvements, it is crucial to understand the communication breakdown in today's environment [7]. Another crucial aspect is that the inadequate performance of the construction business is frequently attributed to poor on-site communication management [7]. This research believes that MSMEs maximize the utilization of features on FOSS ICT and can have a better project experience for the organization, leading to commercial benefits.

Experts have emphasized poor communication as a problem in the construction industry. Collaboration is an effective way to overcome these difficulties facing the construction sector [8]. Construction project management is closely related to collaboration [9]. The use of digital technologies affected sustainability performance and suggested that stakeholder collaboration played a mediating function based on organizational information processing theory (OIPT) to help people better comprehend the advantages of adopting these technologies in building projects from a sustainability perspective [10]. The relationship between the adoption of digital technology and the performance of the economy and environment is partially mediated by stakeholder participation [10]. Coworkers should develop successful collaborative behaviors that promote an integrated collaboration mode [9]. This research argues that collaborative behavior can overcome issues and integrate ideas within an organization.

Internal communication in firms has changed dramatically due to recent technological breakthroughs. According to a recent study, most businesses use internal communication for various goals, including assisting employees in understanding the business and delivering performance [11]. [11] argue that internal communication refers to a discourse between coworkers and management and between coworkers and coworkers within a company. Internal communication has historically included face-to-face interactions such as staff meetings, one-on-one talks, and print items like reports, memos, and newsletters. The internal communication environment has changed significantly since the rise of digital technology. In today's business world, individuals and companies usually want to communicate utilizing technology or electronic means to overcome communication obstacles [11]. Social media and technology do not necessarily replace face-to-face communication. However, these are typically more complex and costly in today's businesses, and arranging meetings is less straightforward than it once was. Therefore, the change in how business is conducted will significantly impact the organization.

One of the fundamental parts of project management is communication. This process allows an organization to interact with the external and internal environments, provides information needed to ensure the company's smooth operation, and foresee and carry out the changes the organization needs to grow. Project communication management refers to the extent of planning, managing, and monitoring communication with its project stakeholder [12]. Additionally, [12] also explains that two accounts that make successful communication, there are developing communication strategies based on the needs of the project and the project's stakeholders. Project communication management ensures the information flow is well distributed and controlled within the organization or even to all stakeholders in the broader picture. Moreover, a previous study also mentions that communication studies are situated in the center of the heart of a project, whilst a project manager spends most of the time communicating with project stakeholders [13]. [13] also stress that project managers should

overcome hurdles to deliver abundant information to stakeholders to make the project successful. Hence, developing planning, executing, and monitoring communication are essential to all project participants to provide perfect information flow for the benefit of the project itself.

In communication organization theory, the shared goals between members of an organization are the ultimate driver to achieving organization objectives. [14] believe collaboration and motivation during project execution are essential to achieve a successful project. Additionally, a previous study also stresses that in group meetings, to collaborate and exchange ideas to overcome project issues [15]. previous study that focused on several international construction projects in the United Kingdom observed that communication style in project communication plays a pivotal role in determining the success of a project's execution [16]. It may conclude that communication and collaboration are keys to unlocking information between stakeholders and achieving successful projects.

Many previous studies have observed the importance of information distribution flow for effective communication and collaboration in remote collaboration. A previous study focused on remote collaboration in Canadian during Pandemic COVID 19, and the study revealed that productive and meaningful remote collaboration could be achieved with the use of communication technologies such as Doodle, Zoom, Google Documents, and Google Drive [17]. Another study states that remote collaboration aims to increase the presence of an expert remotely so that distance users can get support anywhere and anytime with technological support [18]. [19] unveil that remote collaboration exists through engineering approval between stakeholders using virtual reality technology to collaborate in the construction project. Therefore, this research believes that technology plays its part in accelerating the communication process between stakeholders, specifically in executing a remote project.

In the digital-based communication transaction, Actor-Network Theory (ANT) is central to the heart of communication study. [20] explained that ANT is a transaction process between actor and actant within networks. Within this network, the transaction can be a tangible or an intangible form. The results of this transaction can have impacts on the network environment. [21] further stated that actors and actants coexist in a multilevel relationship. The relationship between actors and actants shares common goals and objectives. This research believes that ANT is a flat ontology in which humans and non-humans are not seen as separate entities. The theoretical framework is that actors will be the primary driver to accelerate communication, whether humans or non-humans. In a machine-human relationship, previous research reveals how a subway infrastructure plays the driver in the relationship with its passengers [22]. [22] explains that this interaction can result in a mixed relationship (positive and negative). In a manufacturing company, it is found by previous research that Google Spreadsheet files (non-human) as actors in accelerating communication and collaboration internally [3]. ANT will be used to identify the primary driver in the remote communication and collaboration project.

Based on these theoretical frameworks and shreds of evidence, the research question formulated for this research is: "To what extent is Free Open-Source Software able to provide effective and efficient internal communication in an MSMEs organization in a remote project execution?"

Despite previous research discussing the importance of communication and collaboration in the project execution phase worldwide, only some are examining the use of FOSS ICT for remote communication and collaboration in MSMEs business in Indonesia. Therefore, this

research aims to reveal how MSMEs used FOSS ICT channels to have a successful project, specifically in Indonesia. Hence, this research will bridge the gap from previous studies, adding another dimension to the communication studies in a project in MSMEs in Indonesia. From a practical perspective, this research will benefit MSMEs industries in Indonesia that want to perform a remote construction project and be able to plan, monitor, and control the project's technical specification, quality, and commercial perspective. This research will also give a broader perspective on how an organization should communicate and collaborate between office and site teams in a remote schema. From an educational perspective, this research will provide alternative solutions to the organizational communication problem, namely remote internal communication processes in MSMEs.

2. METHODOLOGY

Virtual ethnography, observation, and discourse analysis were used during this research's data collection and examination process. The qualitative approach was chosen due to the abundance of data that enabled this research to examine the behavior within the organization. This research argues that the qualitative approach is the perfect method for revealing organizational communication and collaboration.

Virtual ethnography involves investigating a virtual ecosystem such as the internet-based environment [23]. Furthermore, [24] explain that ethnography on the internet-based environment is aimed at the communication of its user within online space; this interaction will also shape the offline behavior of its users. Another research also describes that ethnography using a digital method focuses on observing the realm of the virtual world and its effect on the offline world [25]. Based on previous findings, virtual ethnography is an essential qualitative method to obtain robust data in a virtual world and to relate its effect to the offline realm.

Observation refers to how researchers are involved indirectly by not interfering with the interactions [26]. [27] explains that during the observation, the observant should be able to post themselves to a position to obtain the depth of the data. This research, hence, will position itself as an observer of interaction in the several online files of Google Spreadsheets to investigate the interaction between its users during the project execution phase. Text-based discourse analysis is used to examine the communication transactions between parties. [28] refer to discourse analysis as the primary key to understanding the phenomenon in the communication field. Additionally, [29] use discourse analysis in the online environment to examine the effects of text-based persuasion on the offline world's decision-making. Therefore, this research will utilize discourse analysis to reveal the text-based communication in the Google Spreadsheet files.

The project started in January 2021 and was commissioned in April 2021. The data collected from Google Spreadsheet was taken from the google drive file, namely Usulan Pembelian Barang Jasa N21001 (Procurement Planning N21001) and Laporan Harian (Progress Report), of Natakota email's account. The primary data were these files used as the main source of communication, collaboration, and exchanging information between the employees from the main office and the Site. Procurement Planning N21001 file was used to plan the purchase of goods and services and it was used as the primary source of virtual ethnography and observation subject.

3. RESULT AND DISCUSSION

Natakota used Google Spreadsheet as the primary source for communication and collaboration internally throughout the project execution of civil construction at the remote Site in 2021. Figure 2 shows how the Procurement Planning N21001 file is being used by its users. The file generally has six sheets containing the breakdown of the works (e.g., preparation, office, warehouse, mess hall, genset, and security checkpoint). These sheets' work breakdown structure (WBS) is akin to the Bill of Quantity (BOQ) given by Natakota's client. WBS refers to how an organization breaks down the project into several levels, such as sub-project, works, sub-work, package, and so forth. During the observation, Natakota used two levels of WBS. The first level consists of preparation, office, warehouse, mess hall, genset, and security checkpoint. Furthermore, the second level consists of several subtasks from each level one task. For instance, the preparation (level one) consists of nine subtasks, namely (1) mobilization, (2) fence works, (3) temporary site office, (4) water and electricity, (5) health and safety, (6) security, (7) report and as-built drawing, (8) preparation work, and (9) measurement works. This interface is used in every sheet (e.g., Office, Warehouse, Mess Hall, Genset, Security Check Point) in this file.

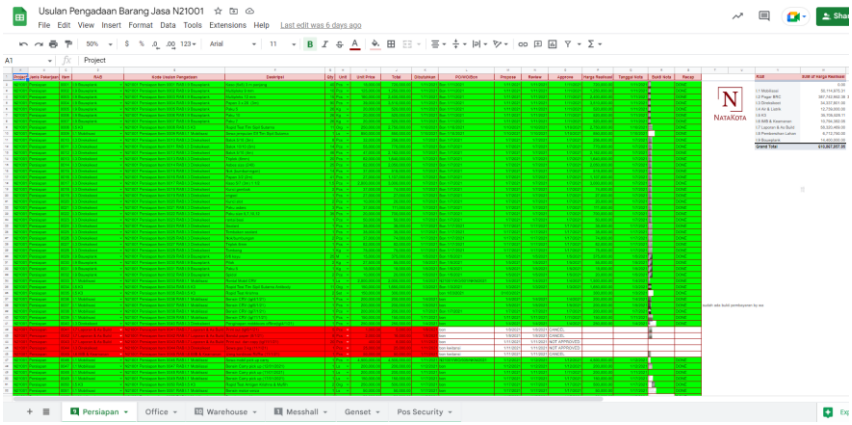

Figure 2. The user interface for the Procurement Planning N21001

A significant concern for MSMEs in the construction industry is monitoring the spending when the construction project is in a remote area. Using this Google Spreadsheet file, Natakota's finance team and project manager can perform live monitoring of the cost control for this project without any worry that this project is overspending, or the money sent to the Site is being used for useless material, or even being corrupted. Furthermore, Figure 2 also provides the spending recapitulation from level two WBS; therefore, Natakota's management can monitor the project's spending remotely.

Each sheet has several columns that can only be filled by a designated user. The columns contain several items, which portrays in Table 1. Natakota used "Protect Range" features in Google Spreadsheet so only designated employees can access specific columns to fill it. During the online ethnography process, it was found that users mainly use "the comment and tag" function to communicate with each other. Each sheet has several columns that can only be filled by a designated user. The columns contain several items, which exemplifies in Table 1. Natakota used "Protect Range" features in Google Spreadsheet so only designated employees can access specific columns to fill it. Table 1 also defines the descriptions as well as functions of each column. It is found that Natakota's team also uses several Google Spreadsheet formulas to make it easier for users, such as in the "Procurement Planning ID" and "Total Price" columns. Natakota designs its Google Spreadsheet File for approval purposes so that

only certain positions can access the column. For instance, in the "Proposed By" columns, only GA-Site employees can submit the case. While for the final approval on the "Approve By" column, only PM-HO can access it.

Table 1. Function and Access of the Procurement Planning N21001

Description	Function	User
Project ID	Code for the project, in this case the project was named N21001	Purch-HO
Working ID	Name of level one WBS: preparation, office, warehouse, mess hall, genset, and security checkpoint.	Purch-HO
Item ID	Item unique number.	Purch-HO
Budget (RAB) ID	Name of level two WBS from each level one WBS based on the BOQ.	GA-Site
Procurement Planning ID	Generate automatically by the formula: *=A2&" "&text(B2,"0000")&" Item "&text(C2,"0000")&" RAB "&D2*	Purch-HO
Description	Goods or services description.	GA-Site
Quantity	The number of goods or services.	SE-Site
Unit	Name of the unit (e.g., lump sum, Kg, pcs, roll, and man-hour)	SE-Site
Unit Price	Price proposal from the site.	GA-Site
Total Price	Generate automatically by the formula: *=I2*G2*	Purch-HO
Deadline	The goods or services deadline must be available at the Site.	SE-Main
Purchase/Work Order ID	Unique ID for each purchase of goods and services.	Purch-HO
Propose By	The GA-Site proposed to purchase goods and services. The GA-Site tags Fin-Main for approval using the comment and tag function in the Fin-Main box column.	GA-Site
Review By	The Fin-Main reviewed the proposal, shall there is a technical or commercial deviation, the GA-Site needs to revise the proposal using comment and tag. Shall the proposal approve the Fin-Main tags PM-Main for approval using comment and tag.	Fin-HO
Approve By	The PM-Main reviewed the proposal, and shall there is a technical or commercial deviation, the GA-Site and/or Fin-Main need to revise the proposal using comment and tag. Shall PM-Main approve the proposal so the team can purchase the goods or services.	PM-HO
Actual Price	As reported by GA-Site or Fin-Main, it depends on where the goods or services are purchased.	GA-Site or Fin-HO
Invoice Date	The date of the invoice.	GA-Site or Fin-HO
Invoice Picture	GA-Site or Fin-Main stores proof of invoices in the Google Spreadsheet's designated box to complete the purchasing process so that the PM-HO can monitor.	GA-Site or Fin-HO
Recap	Once all the item is done and payment is paid to the vendors, Fin-Main notes "DONE" in the designated box.	Fin-HO

*PM-HO refers to Project Manager
*Purch-HO refers to Purchasing Supervisor
*Fin-HO refers to Finance Supervisor
*SE-Site refers to Site Engineer
*GA-Site refers to General Affairs Supervisor

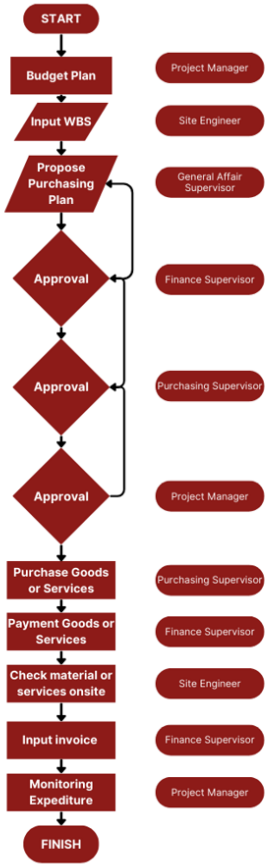

Figure 3. Predetermined user communication flow chart on purchasing material

Furthermore, Figure 3 shows the flow of the communication process. The communication flow was established before the project started and shared with the employee and management to determine the communication process. This communication process flow is essential in the planning stage as it is stressed the importance of the project communication management body of knowledge [12]. Figure 3 commences the rule on how procurement processes shall be done during the project phase. Users should follow this flowchart by proposing, approving, and reporting the procurement process during the project execution.

Figure 4 illustrates how users interact with each other during the procurement process. In the Project Management Body of Knowledge [12] procurement process is defined as activities to plan, manage, and control the buying of goods used for the project. These two Figures show how users exchange information and communicate using the "Comment" feature. The discourse analysis for these two Figures indicates that users use the "Comment" feature to eliminate uncertainties to have the approval to purchase specific goods for the project. The elimination of ambiguity is a crucial step in establishing effective communication.

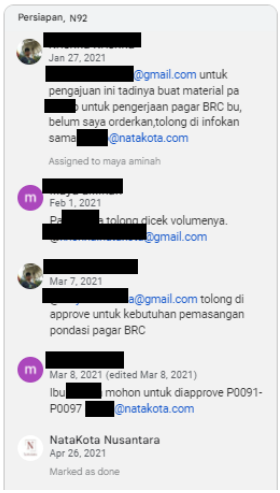

Figure 4. User communication strategy example by using comment and tag function

Ambiguity in this observation defines unclear information provided by one party, which the other party needs to clarify it means. In project procurement management, the ambiguity elimination process will benefit an organization by giving suitable funds for exemplary work. Hence, the organization will benefit commercially from less ambiguity because they know what to purchase for the task and at what time and price. One principle in project management is Just-in-Time, whereas buying the goods at the right time. This jargon minimizes the idle time of goods at the Site. For instance, if goods arrive at the Site too early, they will be inoperative. However, the cost of money for nonfunctioning goods will reduce the profit of the project itself.

To control purchasing process, Natakota's users used the "Put Image in Selected Cell" feature to submit scanned or pictures of invoices. This feature enables Natakota's office finance team to verify the purchase from the site team. Figure 5 shows how the feature works. The picture can be expanded and stored in a specific column from the work that needs funds.

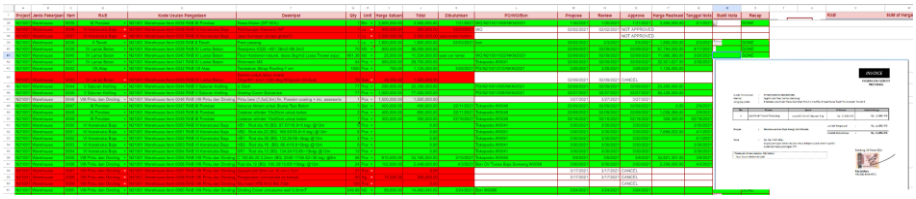

Figure 5. General Affairs Supervisor from Site posts an invoice so that the finance supervisor and project manager from the head office can review it in real-time

Moreover, one of the features in Google Spreadsheet is the "Pivot Table". This feature enables users to recapitulate the total spending, as Figure 6 demonstrates. With this feature, management may control the cost of the project directly. This cost control activity can be done remotely; hence the decision-making can be agile. The agility of the decision-making process can be pivotal to project success.

Figure 6. The sum of expenditures using pivot table function

Based on these findings, ANT believes that Natakota's Google Spreadsheet File is the basis of establishing the network. From ANT's perspective, the complex communication network is established during the project communication between users (site-based and office-based). Communication flow and rules on the Google Spreadsheet File were predetermined. This process is believed to be the elimination of ambiguity. The primary driver of the communication process in this network shall be the predetermined rules as well as the communication flow itself. Using the ANT paradigm, this research argues that users can be productive if they consistently use the predetermined rules.

Furthermore, features in Google Spreadsheet, such as "Comment", "Protect Range", "Put Image in Selected Cell", and "Pivot Table" are identified as the driver of the communication process during the project. It was revealed that the "Comment" is a powerful communication feature while there are ambiguities and uncertainties. For instance, as Figure 4 and Figure 5 exhibit, users exchanged information to confirm the need for funds for particular projects to eradicate the confusion of purchasing material or services. The "Protect Range" feature protects purchasing proposal submissions and approval. This feature is believed to protect the project from misleading during purchasing. For example, shall the PM-HO declines to purchase goods or services because it is over budget so that FIN-HO and GA-Site should resubmit the purchasing proposal.

The findings align with ANT's flat ontology jargon in which actors are not always human (it can be software, machine, or artificial intelligence). Actors are nodes that shape the communication process in the Actor-Network. This research reveals that features in the Google Spreadsheet and predetermined rules are the primary actors shaping the communication process during the project phase.

4. CONCLUSION

Project communication management is the art of managing the message from one side to another so that the organization can reach its ultimate goals. For an MSME, successfully utilizing ICT is critical to help them thrive and grow. As a form of FOSS and ICT, Google Spreadsheet can be a powerful tool for MSME in solving communication and collaboration issues in a construction project located in a remote area. An organization needs to be aware of the importance of internal communication to obtain a successful project. Therefore, they need to maximize the use of FOSS and ICT, which are relatively free or have a competitive price, for executing their project. It is in line with previous research which observe the role of FOSS in internal communication for the project execution phase in a large-scale company in Indonesia [3]. [3] reveal that FOSS can be a powerful tool to accelerate organizational internal communication. In the form of Google Spreadsheet, FOSS can be a competitive solution with its real-time collaboration features for the MSMEs industry.

Further research needs to be performed on the roles of another form of FOSS and ICT in developing the MSME in Indonesia. For instance, the research can focus on types of FOSS or ICT that MSME uses to run their business, whether this tool gives a competitive advantage or drawback. This future research can be an alternative suggestion for MSME business to grow their business. From a communication study standpoint, future research can be performed on the relationship between business leaders' (in MSME) perspectives towards FOSS and ICT and the growth of their business. The findings help obtain an outlook for communication, business, economic, and information-technology studies.

ACKNOWLEDGMENT

This research wants to express gratitude to PT Nata Kota Nusantara, which permitted the study to develop the digitalization of MSMEs in organizational communication and project communication studies.

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