

# Utilization Analysis of Cloud Computing on SMEs : Systematic Review

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## ABSTRACT

Business Process Management Strategy of a company is not separated from the use of digital technology. The Implementation of digital technology in a company can be supported using cloud computing service, which contributes to the access, data security, and other benefits that can improve the productivity and performance of the company. SMEs is a type of business that is being encouraged by the government to improve the nation's economy. SMEs have the potential to increase productivity through cloud computing services. Based on the type of cloud computing, it is divided into three types namely IaaS (Infrastructure As a Service), PaaS (Platform As a Service) and SaaS (Software As a Service) which can be utilized based on the needs of each business person. This systematic review aims to analyze the types of cloud computing that support SMEs business processes. The method used in compiling this systematic review is by using the PRISMA Framework. This systematic review reviews twelve articles. The result of this systematic review is a list of cloud computing support for SMEs that can be implemented by other SMEs in increasing productivity and performance.

## I. Introduction

A dynamically developing economic market requires businessmen to continue to be creative and innovate to keep their businesses going[1]. Technology is one of the strategies of businessmen in innovating and increasing the value of the goods or services they offer. Technology can fully support a company's business processes starting from the planning process, production, marketing and others[2]. Research conducted by [3] revealed that 30% of large companies in the world have used cloud computing service technology that is of type of infrastructure as a service (IaaS). Carl Hewitt in [4] revealed that cloud computing is a new paradigm, where information is stored permanently somewhere on the internet and can be accessed through desktops, tablet computers, notebooks, handhelds, sensors - sensors, monitors and others. This is reinforced by the argument of Armbust (2009) in [5] Cloud computing has five characteristics namely on-demand (consumers can determine computing capabilities unilaterally), broad network access (capabilities that are available through the network and can be accessed through standard mechanisms that introduce the use of various platforms), resource pooling (pooling of computing resources owned by providers to serve is different, determined dynamically and assigned according to customer demand), rapid elasticity (the ability can be established and released in an elastic way in some cases is done automatically to count out and enter quickly on demand), measured service (supervises and optimizes the use of resources automatically by utilizing the measurement capability at several levels appropriate to the type of service). This cloud computing technology trend is presented as an effort to allow access to resources and applications from anywhere via the internet so that the limitations of utilization of ICT infrastructure can be overcome[5]. Seeing the rampant implementation of cloud computing in companies, attract researchers to conduct a systematic review study related to cloud computing support in the SMEs business process which is a type of business based on micro, small and medium enterprises[6], where this type of business is proven to contribute for the economy[7].

### A. Cloud Computing

Cloud computing is a combination of utilization of computer technology and internet-based computer development[8]. This technology arises because of the need for businessmen or industries in developing capacity. Capacity development is related to data storage space requirements, data based services, and unlimited data access[9] Cloud computing includes internet-based services, that

is a computational model such as storage, net networks and software are provided as services on the internet or on local networks if there is already infrastructure in it. Arraffie et. al argued that cloud computing has the principle of flexibility in accessing data which means it can be accessed from anywhere via fixed devices such as laptops, mobile devices and others by just using the cloud, which means the internet as a means of storing data online. In addition, cloud computing has the ability to provide a variety of applications that can be used directly without the downloading and installation process on a computer[10].

### B. Cloud Computing Service

Arraffie et al. explained there are three cloud computing services, among of them[10] :

- Software as a Service (SaaS) Software as a Service is a type of cloud computing where an application is offered as a service to clients, and the application can be accessed via the internet or LAN. Clients do not need to do the installation, upgrade, or maintenance, all are done by SaaS cloud computing providers.
- Platform as a Service (PaaS) On Platform as a Service, the client is provided with the resources needed to create an application entirely from the internet, without having to download or install software. An example of PaaS cloud computing is the Google app Engine. Client can create a website through a web browser.
- Infrastructure as a Service (IaaS) In contrast to SaaS and PaaS cloud computing where applications are available to be used client, IaaS cloud computing provides hardware services that can be used according to the Client's wishes. The client can adjust the hardware specifications as needed, such as the number of processor cores, RAM (Random Access Memory) capacity, hard drive capacity and the speed of the NIC (Network Interface Card). Infrastructure as a Service (IaaS) cloud computing can also be called cloud computing Hardware as a Service (HaaS). Example: Amazon EC2, Amazon S3.

### C. SMEs

Descriptions related to SMEs in each country may have different views, even though the meanings have in common. Therefore, in this study, to open up insights related to this research, researchers took the perspective of the interpretation of SMEs from the Indonesian state. According to Prihatno, SMEs (small and medium enterprises) in Indonesia generally have the following characteristics[11] :

- Management stands alone, in other words there is no strict separation between the owner and the manager of the company. The owner is a manager in the SMEs.
- Capital is provided by an owner or a small group of capital owners.
- The area of operation is generally local, although there are also SMEs that have an overseas orientation, in the form of exports to trading partner countries.
- Company size, both in terms of total set, number of employees and small infrastructure.

In the era of globalization, SMEs face several challenges among them[11] :

- There is no clear division of tasks between administration and operations
- Most SME businesses do not yet have legal entity status
- The main problems faced in fulfilling the needs of labor are the unskilled and high cost labor
- In the field of marketing, the problem is related to the number of competitors engaged in the same industry, the relative lack of foreign language skills as an obstacle in negotiating and penetrating overseas markets.

## II. Objectives and Questions Research

The overall objective of this literature review is to identify a cloud computing approach that can support SME business processes. Therefore, the following research questions (RQ) can be formulated:

- RQ1: Does cloud computing (IaaS, PaaS, SaaS) support SME business processes?
- RQ2: Which cloud computing services (IaaS, PaaS, SaaS) most support SME business processes?
- RQ3: What activities in the SME business process can be supported by cloud computing?

At RQ1, we identified a cloud computing approach that supports SMEs business processes that we obtained from a systematic review. This information helped us in determining which cloud computing support is the most widely implemented in SMEs, to answer RQ2. We used the results of the identification list supported by cloud computing to answer RQ3. We hope that with these three RQs, readers will get insights related to cloud computing support in the SMEs business process

## III. Research Methods

This study was prepared as a systematic review, the guidelines that we used in the preparation of this systematic review are the PRISMA (Preferred Reporting Item for Systematic Review and Meta-Analysis) guidelines[12]. Prisma provides twenty-seven lists of items that need to be considered in preparing a systematic review. The literature that we reviewed as material for this systematic review is a literature that discusses cloud computing at SMEs. Our eligibility criteria were applied to the literature that we will review, namely the literature linked by the academic databases ScienceDirect, Emerald, Wiley, IGI Global, Routledge and SemanticScholar. To maintain the renewal of our study, researchers chose literature published in 2017 or more. Whereas related to the type of literature we limited, that is only literature in the form of journals and proceedings. In searching literature on each publisher's source, we used the following keywords:

- "Cloud computing" & "SME"
- "IaaS" & "SME"
- "PaaS" & "SME"
- "SaaS" & "SME"

Literature that was collected from the search process will be filtered several times. In the first filter, we eliminated all the literature from the search source by looking at the keyword matches that we have set previously. In the second screening we eliminated duplicate literature. Next, we ensured the relevance of the literature by reading abstract and skimming the contents. The filtering process of the literature was carried out independently by the researcher. After the literature is obtained, we conducted a review of the written material that will be used as a reference in writing a systematic review. The results of the review, we loaded in a summary that lists cloud computing and its activities from each literature. In this systematic review, we focused on the use of cloud computing revealed by literature sources.

## IV. Research Methods

Search that we did on Academic ScienceDirect Database, Emerald, Wiley, IGI Global, Routledge and SemanticScholar produced a total of 676 citations. However, from 676 existing literatures, only 43 literatures whose titles had relevance to keywords that have been set, most of the literatures did not focus on the use of cloud computing. From 43 literatures, we did filtering by removing duplicate citations. Evidently it was found 9 duplicate literatures, so that there were 34 literature left. After that, we did filtering again by reading abstracts and skimming the contents that really fit or were relevant to the purpose of systematic review. In the final stage, we obtained 12 literatures that met the requirements. We made these results a reference for conducting a systematic review.

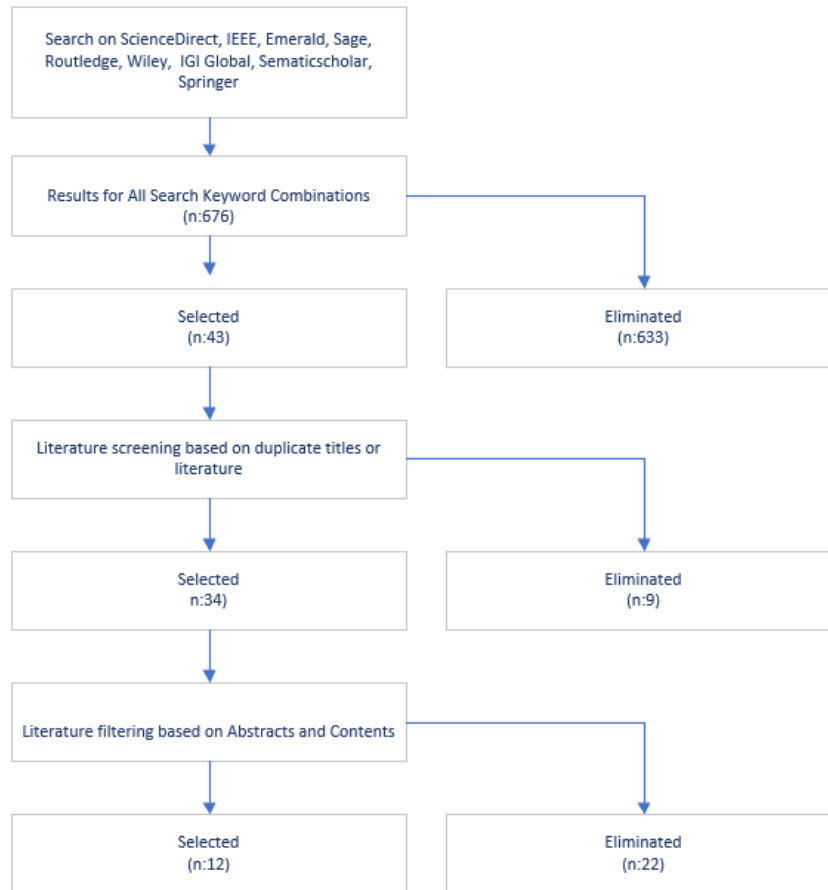


Figure 1. Flow process of literature search

The characteristic of the literature we received was literature that was in accordance with the topic, namely discussing about the use of cloud computing at SMEs. We accepted types of journal literature and proceedings published in 2017 or more. In the validation process we set the control variables namely IaaS, PaaS, and SaaS. From these three variables we made a literature list that mentioned cloud computing support, which we then used to answer RQ1. The results of cloud computing identification in the literature can be seen in table 1. Following:

Table 1. List of cloud computing services that support SMEs

| Literatur | IaaS | PaaS | SaaS | Cloud Computing  |
|-----------|------|------|------|--|
| [13]      | Yes  | Yes  | Yes  | This service is used to support the company's operational process      |
| [14]      | No   | No   | Yes  | This service is used to support the company's operational processes    |
| [15]      | No   | Yes  | No   | This service is used to support the development of PaaS simantic Model |
| [16]      | No   | No   | Yes  | This service is used to support E-Commerce                             |
| [17]      | No   | No   | Yes  | Service not specifically   |

| Literatur | IaaS | PaaS | SaaS | Cloud Computing  |
|-----------|------|------|------|--|
|           |      |      |      | mentioned  |
| [18]      | No   | Yes  | Yes  | The service is not specifically mentioned, but is used to increase productivity and maintain data security |
| [19]      | No   | No   | Yes  | This service is used for the delivery model, because it has the ability and saves cost                     |
| [20]      | No   | No   | Yes  | Doesn't explain utilization  |
| [21]      | No   | No   | Yes  | This literature does not explain its utilization   |
| [22]      | No   | No   | Yes  | This literature does not explain its utilization   |
| [23]      | Yes  | No   | No   | The literature does not explain the utilization  |
| [24]      | No   | No   | Yes  | This literature does not explain the utilization   |

Two literatures [13],[23] revealed that SMEs utilize IaaS Cloud Computing services. Three literatures [13],[15],[18] revealed that SMEs utilize the PaaS cloud computing service. Ten literatures [13],[14],[16],[17],[18],[19],[20],[21],[22],[24] revealed that SMEs utilize SaaS cloud computing services. Although each literature reveals differences in the use of cloud computing services, almost all claim that cloud computing services support business processes at SMEs.

Table2. List of the most widely used Cloud Computing Services at SMEs

| Type of Cloud Computing Service | Total |
|---------------------------------|-------|
| IaaS                            | 2     |
| PaaS                            | 3     |
| SaaS                            | 10    |

Table 2 above helps to answer RQ2. The table shows that SaaS cloud computing services support or benefit the most SMEs business processes. SaaS services are used by SMEs in increasing the operational productivity of their companies and can also be used to support E-Commerce, in addition to the literature as well as reasons for choosing SaaS because these services provide ease of data transmission and reduce operational costs. Based on table 1. Researchers map cloud computing services to SMEs which can then be used to answer RQ3. The following is table 3. Mapping the utilization of cloud computing services at SMEs:

Table 3. Mapping the use of cloud computing services at SMEs

| IaaS                        | PaaS                                      | SaaS                        |
|-----------------------------|---|-----------------------------|
| Support operational process | Support operational process               | Support operational process |
|                             | Support the development of the PaaS Model | Support the increasing      |
|                             | Increasing productivity and data security | Support productivity        |
|                             |   | Support data security       |
|                             |   | Support data sending        |
|                             | Reduces financing                         |                             |

## V. Conclusion

The purpose of this systematic review is to determine the support of cloud computing services at SMEs. Cloud computing services are identified based on three variables namely IaaS, PaaS, and SaaS. This literature review, make it possible to identify three questions, namely:

- RQ1: Does cloud computing (IaaS, PaaS, SaaS) support SMEs business processes?
- RQ2: Which cloud computing services (IaaS, PaaS, SaaS) most support SMEs business processes?
- RQ3: What activities in the SMEs business process can be supported by cloud computing?

RQ1, based on the literature identification results found that each literature revealed the use of cloud computing services, although not all use the three cloud computing services, thus it can be concluded that the SMEs business process can be supported using cloud computing services. While RQ2, based on table 2 highlights the number of cloud computing services discussed in the literature, so it can be concluded that most studies discuss the SaaS cloud computing services. This shows that there are opportunities to expand research into IaaS and PaaS services.

RQ3, based on thickness 3 in this article shows the use of cloud computing services in SMEs, so it can be noted that, cloud computing can be used as an alternative strategy in increasing the productivity and efficiency of SMEs business processes. This article highlights that SMEs use IaaS, PaaS and SaaS cloud computing services. Although not all literature reveals the use of the three services. This can be an input for SMEs that cloud computing services can be an alternative strategy in increasing company productivity and performance.

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