



## Cloud Computing-Based Point-of-Sales Readiness for Surabaya's Small/Medium Enterprises

Adi Suryaputra Paramita<sup>1</sup>

<sup>1</sup>School of Information Systems, Universitas Ciputra Surabaya, Indonesia, [adi.suryaputra@ciputra.ac.id](mailto:adi.suryaputra@ciputra.ac.id)

### ABSTRACT

The amplification of Internet technology primarily in cloud technology development is enabling small and medium enterprises (SME's) to utilize the affordable cost of information technology infrastructure and does not require a tremendous expenditure. Today many SME's ready to implements the Internet in their business processes as well as large-scale enterprise, particularly when the internet users also expanding. The data from <http://statista.com> illustrated that numeral of internet user in Indonesia rise drastically over the last three years. This research discusses the eagerness of Indonesian SME's, especially in Surabaya to utilize Point of Sales (POS) application based on cloud computing. The study related to the adoption of the POS done by qualitative research methodology. The completion of this investigation identified the essential factor of POS based on cloud computing adoption which appropriates with IT Users and Entrepreneur's. The most significant factor in cloud computing adoption for point of sales is security and ease of use. Based on that result this study purpose the POS infrastructure for SME's in Indonesia especially in Surabaya.

**Key words :** POS, SME's, Cloud, Internet, Adoption

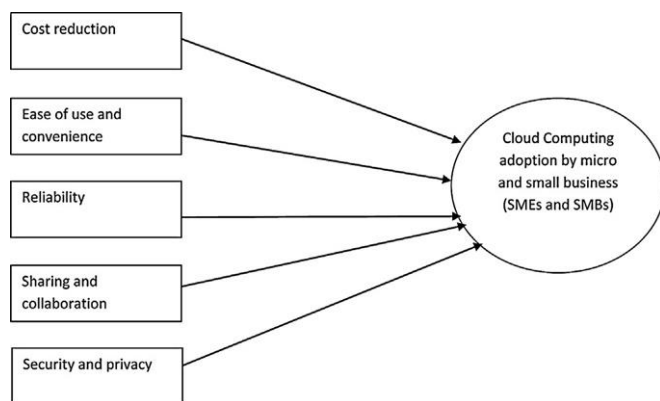
### 1. INTRODUCTION

The advancement of internet technology facilitates small and medium-sized enterprises (SMEs) to quickly enhance their growth. This enhancement is illustrated by internet data statistics in <http://statista.com> that show the expansion of business processes and information transfer by SMEs over the last three years. Internet use in Indonesia has increased significantly. Concurrent with the acceleration of web technologies over the last three years has been the innovative technology termed "cloud computing." Cloud computing permits enterprises of any scale to adopt information technology flexibility under the requirements of their own operating system platform, technology, infrastructure, and application. The flexibility offered by cloud computing presents an advanced solution for SMEs that require such technology but are not able to incur significant expenses for software licenses, hardware, and IT infrastructure. This

research aims to determine the Point-of-Sale (POS) requirements for SMEs and their adoption of cloud computing technologies. Furthermore, this study explores an application model that is specific and suitable for SMEs. Cloud computing constitutes an alternative virtualized IT resource, with the advantages of easy implementation and convenience. Cloud computing vendors guarantee the quality of use for the resources to customers and they carried for what they use for organizations; Such resources mean that the organization does not need to invest in in-house IT solutions. The cloud computing service model is based on the premise that the consumer has the means to manipulate their information over the internet according to their current needs [1].

"Cloud computing" describes internet-based IT services that rely on a virtual infrastructure. Using the recent information technologies, cloud computing services facilitate user admittance through a customized service designed to meet the firm's needs without enormous effort and cost. Cloud services also have an opportunity to shorten the difficulty of information systems, which is a challenge often faced by SMEs [2]. Cloud services enable SMEs to obtain further advantages including expanded business opportunities, lower cost of IT infrastructure, better use of human resources, and enhanced business experience [3]. A notable finding from preceding study is that the cost deduction is not the greatest critical factor for small businesses (SMBs or SMEs) to implement cloud computing. "Ease-of-Use and Comfort" and "Security and Privacy" are the two critical factors for small businesses followed by cost reduction or cost savings. These statements indicate that SMEs are pleased to implement cloud technology due to their ease-of-use, convenience, security, and privacy benefits in addition to diminishing their costs. Factors that considerably affect the embracing of cloud technology are presented in Figure 1[4]. Based on prior research, this research identifies the significant factor for POS-based cloud computing by SMEs in Surabaya and contributes to the literature in this regard. "Point-of-Sale" (POS) refers to a wholesale store, cashier, or the site where transactions occur. Furthermore, POS dictates the hardware and software used for electronic transactions. POS is used in hypermarkets, cafés, hotels, and implicitly by all wholesale business. Most retail POS systems do further than only point-of-sale even for small retailers and many POS systems contain unified bookkeeping, inventory management, procuring demand forecasting, customer relationship management (CRM), service management,

renting, and payroll modules. POS is used as retail management or business management software. Nowadays most of huge retailers using POS software or POS system hardware with uniform interfaces are working with developers to standardize and simplify the connectivity of POS [5]. Cloud computing constitute occasions and challenges for enterprise and IT professionals. Some of these tasks are technical, which can be resolved over time, whilst some are associated to the uncertainties originated from current innovation appearance [6]. Furthermore, cloud computing numerous gains were acknowledged that affect firms' aim to adopt cloud services, in terms of IT cost management and enhancements in IT responsiveness. Some cloud computing resolutions were also supposed to have a higher level of usability and accepted by users [7]. In another prior study recognized numerous research challenges that need advance exploration and analysis. The challenges embrace security, privacy and trust, bandwidth and data relocation, data administration and synchronization, energy effectiveness, and heterogeneity [8]. Based on the prior research, this research would identify the substantial factor for Point of Sales based on Cloud Computing adoption in Surabaya SME's, the research contribution of this study is the essential factor that involved for POS based on Cloud Computing adoption For Surabaya Small Medium Enterprise and suggest the infrastructure of POS based on Cloud Computing.

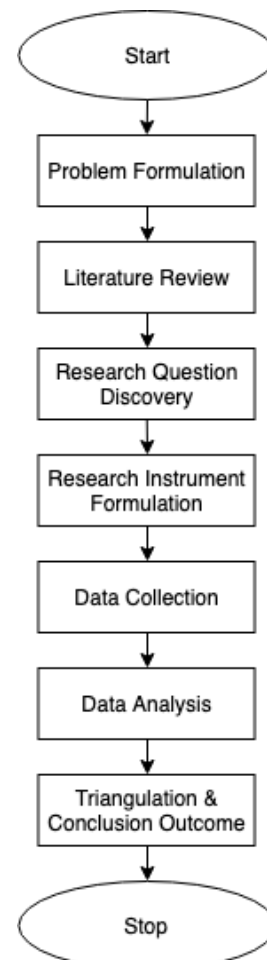


**Figure 1:** Significant Factor For Cloud Computing Adoption.

## 2. RESEARCH METHODOLOGY

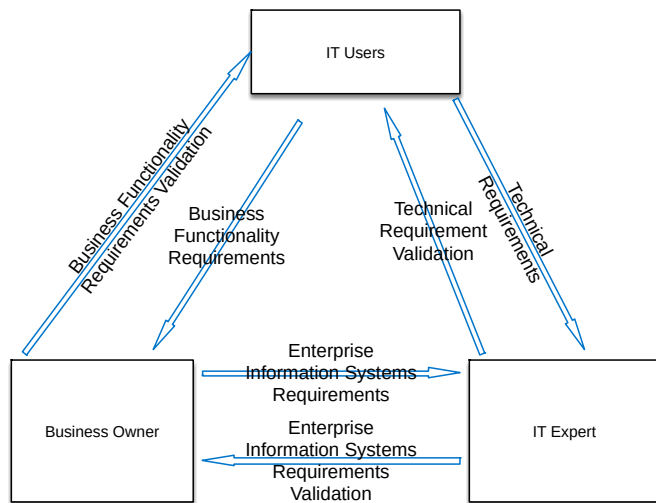
This research implements a qualitative methodology for data gathering, data analysis, triangulation, and conclusion formation. Qualitative data are substantially distinct from quantitative data in that the data are not restricted to standardized measures across a specified continuum. This means that qualitative data are not aggregated as categorical or continuous but rather analyzed purely for content and context. Typical methods of collecting qualitative data include in-depth interviews, focus groups discussion, direct investigation, and document and audio review. Although these data do not allow generalizability, they are useful for generating new theoretical

insights about particular phenomena [9]. The process in this study utilized in-depth interviews with 10 participants comprising IT users, IT experts, and entrepreneurs. The methodological framework for this study is presented as Figure 2.



**Figure 2:** Methodology.

The data for this research were gathered from the interview process with ten informants from three categories: entrepreneurs, IT experts, and IT users. The interviews first addressed the system feature needs of users and entrepreneurs. These requirements were then presented to the IT experts and entrepreneurs for verification. Entrepreneur's suggested features that they require for POS, which were then confirmed by the IT experts. The relations among the participant categories are diagrammed in Figure 3 and participant demographics are reported in Table 1.



**Figure 3:** Informant's Correlation

**Table 1:** Informant Profile.

| User | Role          | Industry Type          |
|------|---------------|------------------------|
| 1    | IT User       | Food and Beverage      |
| 2    | IT User       | Food and Beverage      |
| 3    | IT User       | Food and Beverage      |
| 4    | Store Manager | Food and Beverage      |
| 5    | IT User       | Retail                 |
| 6    | IT User       | Retail                 |
| 7    | Entrepreneur  | Supermarket            |
| 8    | Entrepreneur  | Electronics            |
| 9    | IT Expert     | Information Technology |
| 10   | IT Expert     | Information Technology |

### 3. RESULT

Based on the triangulation sequences of the research process, it was found that the adoption of cloud computing offers the ultimate solution; however, not all IT users can utilize it and not all IT users require mobile technology to operate POS in their daily activities. Participants' needs and their validation during the interviews are summarized in Table 2.

**Table 2:** Summary From In-Depth Interview.

| IT Users                                                                                                                            | Entrepreneurs                                                               | IT Experts                                                             |
|-------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|------------------------------------------------------------------------|
| IT users in retail stores require POS features that correlate with sales activities, storefront administration, payment categories, | All these informants have used IT in their business for more than 10 years. | All these informants have offered IT solutions for at least six years. |

| IT Users                                                                                      | Entrepreneurs                                                                                                                                   | IT Experts                                                                                                                                                       |
|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| and will also print a receipt.                                                                |                                                                                                                                                 |                                                                                                                                                                  |
| Most of the applied POS features work properly.                                               | All entrepreneurs maintain and evaluate their IT equipment annually.                                                                            | All experts' customers maintain their IT devices (e.g., personal computers, networks, and servers) on a regular basis.                                           |
| Ease of use is one of the critical factors for successful POS implementation.                 | Entrepreneur agree that cloud computing is a promised Solution that can reduce IT expenses to operational costs instead of capital expenditure. | Most of their customers are interested in adopting cloud computing for reasons of cost efficiency and concern about data security.                               |
| IT users do not perceive a mobile device cloud connection as a critical requirement.          | All entrepreneurs recognize the need for accessibility for current POS applications.                                                            | There would be no crucial issue if the POS application transferred to cloud computing. However, the barrier in Indonesia is the internet connection speed.       |
| Users require daily transaction reports sent to their email.                                  | Entrepreneurs require transaction data such as sales, purchase, and transfer of inventory.                                                      | The most significant POS features are related to sales transaction activity, payment scheme, stock monitoring, transaction analysis, and an executive dashboard. |
| Sales reports and a regular transaction summary are the essential features in the POS report. | Entrepreneurs expect report features that include the sales summary, sales analysis, sales leaning, and forecasting in a graphical format.      | Specific report features requested by customers are the daily sales summary, stock transferred, data analysis, forecasting, and an executive dashboard.          |

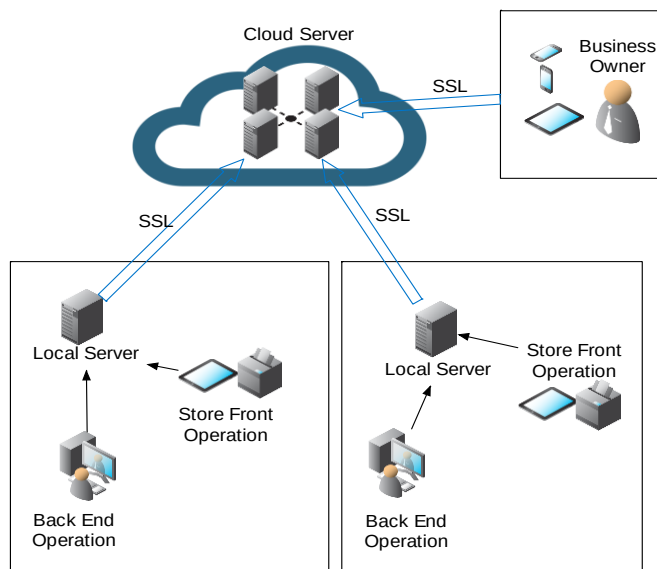
| IT Users | Entrepreneurs                                                                                                                                                                                                     | IT Experts                                                                                                                                                                                  |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|          | Entrepreneurs require additional features to be convenient to apply.                                                                                                                                              | The obstacle for cloud computing adoption in Indonesia is related to internet speed; otherwise, there are no significant issues with features based on cloud computing.                     |
|          | Entrepreneurs require mobile technologies such as smartphones and tablets in order to monitor their store activity. The transaction analysis and dashboard report are also remarkable features for entrepreneurs. | Mobile technologies are proposed for customers that need to observe their firm's operations from anywhere at anytime. Specific desired features on mobile devices are reports and analysis. |
|          | Entrepreneurs require a daily transaction summary delivered by email.                                                                                                                                             | Customers require a daily transaction summary delivered by email.                                                                                                                           |
|          | The most decisive factor for cloud computing implementation is the internet connection speed and application security.                                                                                            | The most critical factor for the adoption of cloud computing is the internet connection speed and application security.                                                                     |

The in-depth interviews with IT users, entrepreneurs, and IT experts determined that cloud computing is a futuristic solution for POS applications even though some of the features not required by IT users. In addition, the solution must be based on customer demands and not only on technological advancements. Previous research from Eleonora Pantano and Milena Viassone (2013) found that recognizing consumer demands is essential for the successful adoption and dissemination of innovations. Notwithstanding, despite a generous number of technologies for POS and the possible advantages that arise from implementing these advanced systems, only a limited number of retailers had adopted them with various approaches [10]. A 2016 study on cloud computing found that data assurance is an essential factor of

cloud computing architecture and that guidelines should be followed to achieve successful implementation [11]. This statement concurs with those made by the entrepreneurs and IT experts in this study as well as with the findings of Sharma and Al Bahdi (2015) who found that service providers must address customers' needs to feel secure entrusting their data to the cloud computing network [12].

#### 4. DISCUSSION

The entrepreneurs in this study had extensive experience in computer science and POS implementation, which was found to be a factor in their early adoption of POS-based cloud computing. Furthermore, this finding concurs with Rahayu and Day (2015) who found that an understanding of IT needs by business owners is a significant factor in technology adoption [13]. Security is the essential concern for the business owner and IT experts. This determinant is confirmed by previous research that found security concerns to be the most significant obstacle to the widespread adoption of cloud computing. Numerous organizations have been reluctant to completely trust cloud computing by shifting their digital properties to a third-party service provider. The conventional IT infrastructure keeps the digital assets in the administrative domain of the organizations [14]. In other research, security control, as part of the corporate governance, was found to be the most appropriate path which to advance the control of security processes and guarantee orientation with business strategies. Information security policy fulfillment requires effective governance prosecution and adequate controls over the organization's personnel [15]. Furthermore, security concerns for cloud computing are related to data breaches, data loss, denial of service, and other more malicious activities that can occur in cloud system information management [16] [17] [18] [19]. From this explanation, it can be seen that security is always a significant concern for cloud computing adoption; therefore, it is essential for a cloud service providers to provide not only reliable, but also safe and dependable cloud services. A recommended POS infrastructure is presented in Figure 4.



**Figure 4:** Recommended cloud-based Infrastructure.

For further development of POS-based cloud computing, Location-based Service (LBS) security protection is an excellent option to address privacy and security issues. Location Based Service (LBS) systems solve issues such as illegal data collection or breaks/leaks of outsourced LBS data by the cloud storage platform. Prevent the tamper and delete of some query results by cloud storage platform or illegal attackers, ensure the propriety and completeness of the received results for the user, avoid the leak of outsourced LBS data caused by collusion conspiracy of cloud platform or illegal attackers [17] [20] [21] [22].

## 5. CONCLUSION

The relevant factors that influence the adoption of cloud computing are its ease-of-use, security, and a high-speed internet connection, with the most salient aspect being security. Presently, point-of-sales features are suitable for SMEs' needs and do not have significant issues when relocated to cloud computing. Mobile technology is a cloud computing enabler due to the widespread adoption of mobile services. Cloud computing will be the prospect solution for Indonesian SMEs when the Indonesian internet becomes more stable and reliable.

## REFERENCES

- Garrison, Gary, et al. "The effects of IT capabilities and delivery model on cloud computing success and firm performance for cloud supported processes and operations." *International Journal of Information Management*, vol. 35, no. 4, 2015, pp. 377-393. Mary C. Lacity and Peter Reynolds. 2014. <https://doi.org/10.1016/j.ijinfomgt.2015.03.001>
- Mary C. Lacity and Peter Reynolds. 2014. *Cloud Services Practices for Small and Medium-Sized Enterprises*. MIS Quarterly Executive 13, 1 (2014), 31.
- Bala Lyer and John C. Henderson. 2012. *Business Value from Clouds: Learning from Users*. MIS Quarterly Executive 11.2012.
- Gupta, Prashant, et al. "The usage and adoption of cloud computing by small and medium businesses." *International Journal of Information Management*, vol. 33, no. 5, 2013, pp. 861-874.
- Sularto, Lana, et al. "User Requirements Analysis for Restaurant POS and Accounting Application Using Quality Function Deployment." *Procedia - Social and Behavioral Sciences*, vol. 169, 2015, pp. 266-280. <https://doi.org/10.1016/j.sbspro.2015.01.310>
- Lin, Angela, and Nan-Chou Chen. "Cloud computing as an innovation: Perception, attitude, and adoption." *International Journal of Information Management*, vol. 32, no. 6, 2012, pp. 533-540. <https://doi.org/10.1016/j.ijinfomgt.2012.04.001>
- Yigitbasioglu, Ogan M. "External auditors' perceptions of cloud computing adoption in Australia." *International Journal of Accounting Information Systems*, vol. 18, 2015, pp. 46-62. <https://doi.org/10.1016/j.accinf.2015.09.001>
- Al-Janabi, S., Al-Shourbaji, I., Shojafar, M., & Abdelhag, M. (2018). *Mobile Cloud Computing: Challenges and Future Research Directions*. *Proceedings - International Conference on Developments in ESystems Engineering, DeSE*, 115(April), 62-67. <https://doi.org/10.1109/DeSE.2017.21>
- Tsai, Alexander C., et al. "Promises and pitfalls of data sharing in qualitative research." *Social Science & Medicine*, vol. 169, 2016, pp. 191-198. <https://doi.org/10.1016/j.socscimed.2016.08.004>
- Pantano, Eleonora, and Milena Viassone. "Demand pull and technology push perspective in technology-based innovations for the points of sale: The retailers evaluation." *Journal of Retailing and Consumer Services*, vol. 21, no. 1, 2014, pp. 43-47.
- Bayramusta, Merve, and V. A. Nasir. "A fad or future of IT?: A comprehensive literature review on the cloud computing research." *International Journal of Information Management*, vol. 36, no. 4, 2016, pp. 635-644. <https://doi.org/10.1016/j.ijinfomgt.2016.04.006>
- Sharma, Sujeet K., et al. "Predicting motivators of cloud computing adoption: A developing country perspective." *Computers in Human Behavior*, vol. 62, 2016, pp. 61-69.
- Rahayu, Rita, and John Day. "Determinant Factors of E-commerce Adoption by SMEs in Developing Country: Evidence from Indonesia." *Procedia - Social and Behavioral Sciences*, vol. 195, 2015, pp. 142-150. <https://doi.org/10.1016/j.sbspro.2015.06.423>
- Mazhar Ali, Samee U. Khan, and Athanasios V. Vasilakos. "Security in Cloud Computing: Opportunities and Challenges." *Information Sciences*, 2015.
- Rebollo, Oscar, et al. "Empirical evaluation of a cloud computing information security governance framework." *Information and Software Technology*, vol. 58, 2015, pp. 44-57.

16. Nzanywayingoma, Frederic, and Yang Yang. "Efficient Resource Management techniques in Cloud Computing Environment: A Review and discussion." TELKOMNIKA (Telecommunication Computing Electronics and Control), vol. 15, no. 4, 2017, p. 1917.  
<https://doi.org/10.12928/telkomnika.v15i4.6574>
17. Yan, Yan, et al. "Location-Based Services and Privacy Protection under Mobile Cloud Computing." Bulletin of Electrical Engineering and Informatics, vol. 4, no. 4, 2015.  
<https://doi.org/10.11591/eei.v4i4.454>
18. T. Hariguna, & Berlilana, "Understanding of Antecedents to Achieve Customer Trust and Customer Intention to Purchase E-Commerce in Social Media, an Empirical Assessment", International Journal of Electrical and Computer Engineering, 7(3), 1240–1245, 2017.  
<http://doi.org/10.11591/ijece.v7i3.pp1240-1245>
19. T. Hariguna, CW. Hung, & H.T. Sukmana, "The antecedent of citizen intention use of e-government service, TELKOMNIKA (Telecommunication Computing Electronics and Control)", 17(1), 202–209, 2019.  
<http://doi.org/10.12928/TELKOMNIKA.v17i1.11588>
20. U. Rahardja, T. Hariguna, & Q. Aini, "Understanding the Impact of Determinants in Game Learning Acceptance: An Empirical Study", International Journal of Education and Practice, 7(3), 136–145, 2019.  
<http://doi.org/10.18488/journal.61.2019.73.136.145>
21. M. S. Ibbini and A. H. Adawi, "Analysis and Design of a Maximum Power Point Tracker for a Stand-Alone Photo Voltaic System Using Simscape," Int. J. Adv. Trends Comput. Sci. Eng., vol. 8, no. 1, pp. 54–57, 2019.  
<https://doi.org/10.30534/ijatcse/2019/09812019>
22. A. Zakaria and M. S. N. Ibrahim, "Numerical Performance Evaluation of Savonius Rotors by Flow-driven and Sliding-mesh Approaches," Int. J. Adv. Trends Comput. Sci. Eng., vol. 8, no. 1, pp. 57–61, 2019.  
<https://doi.org/10.30534/ijatcse/2019/10812019>