Analysis Of Cloud Computing Adoption For Point of Sales Application in Indonesian Small Medium Enterprise

Adi Suryaputra Paramita[1], Trianggoro Wiradinata[1]

1. University of Ciputra, UC Town, Citraland, Surabaya 60219, Indonesia
* E-mail of the corresponding author: adi.suryaputra@ciputra.ac.id

Abstract

The expansion of Internet technology and cloud computing evolution are empowering small and medium enterprises (SMEs) have an opportunity to utilize the affordable cost of information technology and does not require an immense investment. Nowadays many SME's ready to use the Internet in their business processes as well as large-scale enterprise, especially when the internet users outside of their organization is also expanding. Based on data in http://internetlivestats.com over the current five years, Indonesia has a notable increase in the number of internet user. This paper addresses the adoption of Point of Sales (POS) application based on cloud computing for Indonesian SME's, resource exploration related to the use of the POS conducted with qualitative research. The results of this study are recognized the genuine need of POS based on cloud computing and precise with IT Users and business owner.

Keywords: Internet, Cloud Computing, Adoption, SME's, Technology

1. Introduction

The extension of the Internet technology for information transfer nowadays enable small and medium enterprises (SME's) become more easily recognizable by the society. The advancement of internet technology allowed SME's improving their business processes and information exchange, not only for large industry, especially when internet users also increased. Based on data in http://internetlivestats.com above the last five years Indonesia has significantly raised the number of internet users, even for past three years, Indonesia placed 12th in the global for the number of internet users. Together with the rise of web technologies in the last 2-3 Years a new technology called cloud computing has developed, the cloud computing consent enterprise in any scale of business who desire to use information technology resolutions resilient in the requirements of the operating system platform. Technology, infrastructure, and application, the elasticity of the cloud computing can provide a new solution for SME's who want to adopt the practice without spending a significant amount on software and make a massive investment in hardware and IT infrastructure. The objective of this research is to discover the information systems for SME's requirements and the exploration of cloud computing technologies. The results of this study are developing an application model that precise and appropriate for SME's requirements.

2. Literature Review

2.1 Cloud Computing

Cloud computing described as a shared pool of on-demand computing resources that are accessible over the internet and dynamically organized to adjust resource. Cloud computing offers users ubiquitous and convenient access to a shared pool of computing resources consist of networked servers, storage and software applications that are configured based on user requirements, rapidly provisioned to correspond with demand, and made available on a pay-per-use basis. Essentially, cloud computing represents the mode by which IT services are delivered over the internet on a scalable, virtual infrastructure using the latest communication technologies. Allowing businesses and users access to shared resources in a service format tailored to their needs without having to buy, install, maintain, and manage those computing resources(G. Garrison, R. L. Wakefield, and S. Kim, 2015). Cloud services also have the potential to reduce the problem of information systems is a challenge often faced by SMEs. These challenges include among others (1) unfurled management functions through the benefits of information systems, (2) bridging limited funds to have skilled technical employees in information systems, and (3) limitations on the investment of capital in Information and Communication Technology. Some

of these challenges have led SMB's have a slower adoption rate for IT innovation compared to large companies(Lacity, M.C. & Reynolds, P., 2014). Cloud services have the prospect to overcome many challenges, as mentioned above, and needs small investment in Information and Communication Technology infrastructure. Suppliers can even manage These cloud services, and service providers are paid by the system of "pay as you use." Cloud services enable SME's receive additional benefits including increased business focus, the infrastructure is more economical, collective problem solving, experimental business models, reduce dependence on human resources and improve the experience of SMEs (Iyer, Bala & C. Henderson, John., 2012). An important conclusion from the previous research is that the cost savings and cost reduction are not the most important factor for small businesses (SMBs or SMEs) to adopt cloud. "Ease of Use and comfort 'and' Security and Privacy 'is considered the top two priorities for them to take cloud computing, followed by cost reduction or cost savings. This shows that SME's are happy to adopt cloud for ease of use, convenience and better security and privacy in addition to reducing their investments. Factors that significantly affect the adoption of cloud computing are shown in figure 1. (Gupta, P., Seetharaman, A., & Raj, J. R., 2013)
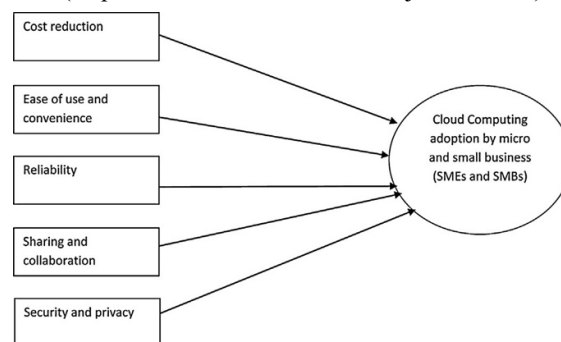

Figure 1. Factors That Significantly Affects In Cloud Computing Adoption

2.2 Cloud Computing

Point of Sales (POS) terminology is a retail store, a cashier at the store, or the location where the transaction occurred. More specifically, POS often refers to the hardware and software used for checkouts - the equivalent of an electronic cash register. POS used in supermarkets, restaurants, hotels, stadiums, and virtually any type of retail business. Most retail POS systems do more than simply the task of "point of sale". Even for smaller retailers, many POS systems already include an integrated accounting, inventory management, purchasing demand forecasting, customer relationship management (CRM), service management, leasing, and payroll modules. Because of these functions, the supplier has sometimes seen a POS as retail management software or business management software. Today, most large retailers using POS software or POS system hardware with standardized interfaces by suppliers and retailers working together to standardize development of computerized systems and simplify interconnecting POS (Sularto, L., Wardoyo, & Yunitasari, T., 2015).

3. Research Methodology

This research uses Qualitative Methodology for collecting information, data analysis, triangulation, result from analysis and conclusion finding. Qualitative studies based on data that are fundamentally different from the data collected in other observational studies designs. The standardized measures employed in quantitative studies constrict the diverse perspectives of study participants along pre- determined continua (e.g. categorical or continuous) so that they can statistically aggregate. The data collected in qualitative studies are typically obtained through in-depth interviews, focus groups, direct observation, document review, and audio recording review. These data, while generally not aimed at establishing generalizability, lend themselves to generating new theoretical insights about particular phenomena (Tsai, A. C., Kohrt, B. A., Matthews, L. T., Betancourt, T. S., Lee, J. K., Papachristos, A. V.,Dworkin, S. L., 2016). This process conducted using in-depth interviews with ten users, and the users consist of IT User, IT Expert and Business Owner. The research methodology of this research shown in figure 2 bellow.
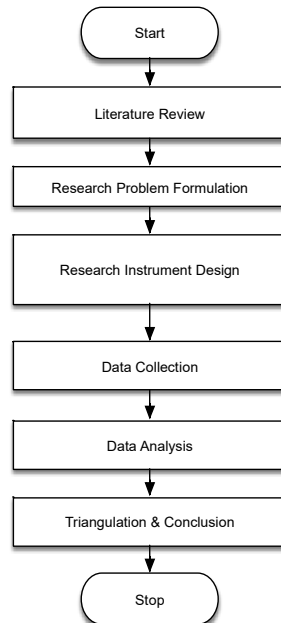
Figure 2. Research Methodology

4. Data Collection

Data collection for this research was done by interview to 10 informants in Surabaya, Indonesia; the sources consist of three categories: business owners, IT experts, IT users. Through the interview process is required to address IT users and business owner needs the features, then this demand will be validated by IT experts and business owners, while business owners can examine the points of the requirements for POS then verified by IT experts. The connection within three informants categories and triangulation process shown in figure 3 below. The informant's profile shown in Table 1 below.
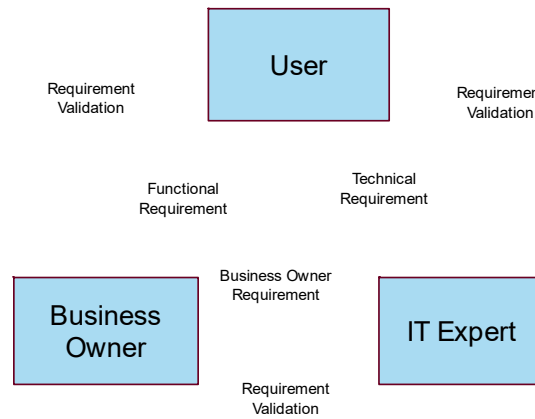

Figure 3. Triangulation Process

Table 1. Informant Profile

User	Role	Industry type
1	IT User	Retail store
2	IT User	Retail store
3	IT User	Retail store
4	Store Manager	Retail restaurant
5	IT User	Retail restaurant
6	IT User	Retail restaurant
7	Business Owner	Supermarket
8	Business Owner	Electronics
9	IT Expert	IT Industry
10	IT Expert	IT Industry

5. Result

After the interview process to gained the features needs of IT users and business owners and then performed the validation from IT experts, triangulation of the interview result begin. The triangulation is done by mapping the keyword and find the correlation the answer between sources. Based on the triangulation results showed that the use of cloud computing would indeed be the future, but not all IT users are ready to use it, based on interviews also revealed that not all IT users need mobile technology to the needs of POS operations. Relations needs and validation of the requirement shown from Table 2 until Table 4 below.

Table 2. Summary From It Users Interview

No	Purpose	Result
1	Discovering what features that require in Point of Sales (POS) as IT Users.	Feature related to sales activity and storefront transaction, including payment activity and print out receipt essentially needed for IT Users in retail.
2	Finding features in POS application frequent errors when applied.	Most of POS application informants used already minor error.
3	Discovering the key factors that make POS application can easily use by IT users.	Easiness of use factor is the most important factor.
4	Discovering information that the use of cloud computing and mobile technologies able help IT users to operate the POS application.	Most IT Users in retail industry don't need cloud computing or mobile technologies to operate the POS Application; they just need Personal Computing.
5	Discovering the critical of recap transaction sent via email feature in POS application.	Daily transactions recap is require sent via email at every end of work shift.
6	Finding the report feature whatever is required at the POS application	Discovering the report features required at the POS application.

Table 3. Summary From Business Owner Interview

No	Purpose	Result
1	Finding out how long it has been using IT for business.	All of the informants using IT more than ten years.
2	Discovering the importance and the ideal period of IT investment and maintenance evaluation.	All of the business owners maintain their IT infrastructure and equipment regularly and review their IT Investment every year.
3	Discovering the use of cloud computing will be the alternative solution for the IT investment and maintenance.	Business Owner believes that Cloud computing is a suitable solution, and can reduce cost of IT investment by switch into IT operational cost.
4	Finding out whether the transaction and report can't see at any time is a limitation in current POS application.	All of the business owners totally agree that the limitation of current POS is about can't be accessed anywhere and anytime
5	Discovering out what features required in POS the business owners point of view.	The most necessary features from business owners are a summary of the transactions that occur every day either for the sale, purchase, and transfer of inventory.
6	Discovering the most necessary reports needed by business owner in POS application.	Business owners require a report in Sales summary, sales item analyst, sales trend and forecasting in a graphical report.
7	Discovering the obstacle when currently POS migrate to cloud computing.	Business owners believe that the migration to cloud computing is no problem as long as they can use all features comfortably with the additional feature of cloud computing.
8	Discovering the advantages of mobile technologies enabling POS operation and the features needed in mobile technology.	Business owners need mobile technologies such as smartphone and tablets to monitor their company activity. Transaction summary, analyst, and dashboard are the features that needed by the business owner in mobile technologies.
9	Discovering the importance of recap transactions every day sending to the business owner via email.	The business owner need received information of daily transaction recap in their email.
10	Discovering what are importance factors in the adoption of cloud computing.	An essential factor of cloud computing adoption is the internet speed and security in the POS application.

Table 4. Summary From It Experts Interview

No	Purpose	Result
1	Discovering the period of providing IT Service.	All of IT experts already provide IT solutions for their consumer more than five years.
2	Discovering the importance and the ideal period of IT investment and maintenance evaluation.	All of their consumers regularly maintain their IT devices such as PC and server
3	Discovering the use of cloud computing will be the alternative solution for the IT investment and maintenance for their clients.	Most of their clients interested to adopt cloud computing because of cost efficiency, but somehow they worried about data privacy.
4	Discovering the opportunity for their products and services transferred to cloud computing.	The POS application had a possibility to transferred into cloud computing but had an obstacle in internet connection velocity and reliability.
5	Discovering the essential from POS in the IT experts point view.	Sales activity, payment method, stock monitoring, report analysis and executive dashboard are the most important feature in POS applications.
6	Discovering the essential report feature in the POS application.	Daily activity in sales, stock moving, business analysis, forecasting, and dashboard are the essential report in POS application.
7	Discovering the obstacle from currently POS application if migrated to cloud computing.	The obstacle for cloud computing in Indonesia is the internet connection; meanwhile, POS features don't have a problem if transfer into cloud computing.
8	Discovering the possibility of mobile technologies adoption in POS application and the essential features in mobile POS.	Mobile technologies are the solutions for a business owner who want monitor their company in anyplace and anytime. POS features should have in mobile technologies is reporting and analysis function.
9	Discovering the requirements of daily transactions summary sent to the business owner via email.	The business owner require that report
10	Discovering the primary factors in the adoption of cloud computing.	The most important factor in the adoption of cloud computing is the internet connection and data security in an application.

Based on interviews with IT users, business owners, and IT experts determined that cloud computing is a promised solution for POS applications, although not all of the features required by IT users. This narrative present that the solution provided must be based on customer needs and not based on advances in technology, and this statement has mentioned by the research conducted by Eleonora Pantano and Milena Viassone in 2013. The study said knowing what consumers and retailers expect acquires importance for the successful adoption and diffusion of innovations. Despite a significant number of technologies for points of sale and the potential benefits emerging from the introduction of these advanced systems, still, only a limited number of retailers adopted them

with different strategies (Pantano, E., & Viassone, M., 2014).

The latest research on cloud computing in 2016 said that data protection is an essential element in architectural principles and guidelines that should follow to achieve success in cloud computing (Bayramusta, M., & Nasir, V. A., 2016), is matched with the business owner and IT Experts statement which said in this research interview. This statement is in line with prior studies in 2015 done by Sharma and Al Bahdi which said service providers need to be addressed the customers to feel comfortable to hand over data to an external big cloud computing network, and this is the part of trust in cloud computing services which indeed by customer (Sharma, S. K., Al-Badi, A. H., Govindaluri, S. M., & Al-Kharusi, M. H., 2016).

Based on interviews with IT users, business owners and IT experts obtained the features that must exist in the cloud-based POS and the factors that influence the use of cloud-based POS. The summary of features need elements that affect shown in Table 5 below. The business owner who becomes the object of this research already using IT for quite long time and have IT background, that factor made this study can successfully identify the features needed for a POS-based cloud computing. Which is consistent with studies that have been conducted by Rahayu and Day in 2015. In this study said that an understanding of the IT needs from business owners is a major factor in technology adoption (Rahayu, R., & Day, J. , 2015)

Table 5. Feature Needs And Adoption Factor Summary

Role	Features Need	Factor Influences
IT Users	- Sales - Store front operation - Stock Transferred - Transaction summary and recap in every shift	- Ease of Use
Business Owner	- Transaction Summary and send it to email everyday - Report Analysis - Dashboard - Forecasting	- Security - Internet Connection
IT Experts	- Sales - Store front operation - Stock Transferred - Stock Audit - Transaction Summary and send it to email everyday - Report Analysis - Dashboard - Forecasting - Items Information - Transaction Audit	- Security - Internet Connection

In Table 5 can be seen that security is the critical part for the business owner and IT experts, this factor related to another previous research which done in 2015 which said Security is one of the most significant obstacles that hamper the broad adoption of cloud computing. Some of business and research organization are reluctant in entirely trusting the cloud computing to shift digital assets to the third-party service providers. The traditional IT infrastructure keeps the digital assets in the administrative domain of the organizations (Ali, Mazhar & U. Khan, Samee & Vasilakos, Athanasios., 2015), another article said Security governance, as part of the company's corporate governance, is the most suitable path by which to gain control of security processes and guarantee an alignment with business strategies. Information security policy compliance requires effective management enforcement with adequate controls over the organization's personnel (Rebollo, O., Mellado, D., Fernández-Medina, E., & Mouratidis, H., 2015). From this explanation can be seen that security always be significant issues for cloud computing adoption, is essential for cloud service provider to provide not only reliable cloud services but also credible and safe cloud services.

6. Conclusion

The Critical factors that affect the use of cloud computing are ease of use, security and internet connection, and an essential part is data safety. Currently, POS features are already enough for SMEs needs and have no difficulty if transferred to cloud computing, mobile technology is a cloud computing enabler at this time because of a lot of mobile user in nowadays. Cloud computing will be the future solution for Indonesian SMEs if Indonesian internet becomes faster and more reliable.

References

G. Garrison, R. L. Wakefield, and S. Kim (2015), "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, pp. 377–393, 2015.

Lacity, M.C. & Reynolds, P. (2014). Cloud services practices for small and medium-sized enterprises. MIS Quarterly Executive. 13. 31-44.

Iyer, Bala & C. Henderson, John. (2012). Business value from clouds: Learning from users. MIS Quarterly Executive. 11. 52-60.

Bayramusta, M., & Nasir, V. A. (2016). A fad or future of IT?: A comprehensive literature review on the cloud computing research. *International Journal of Information Management*, *36*(4), 635-644. doi:10.1016/j.ijinfomgt.2016.04.006

Gupta, P., Seetharaman, A., & Raj, J. R. (2013). The usage and adoption of cloud computing by small and medium businesses. *International Journal of Information Management*, *33*(5), 861-874. doi:10.1016/j.ijinfomgt.2013.07.001

Pantano, E., & Viassone, M. (2014). Demand pull and technology push perspective in technology-based innovations for the points of sale: The retailers evaluation. *Journal of Retailing and Consumer Services*, *21*(1), 43-47. doi:10.1016/j.jretconser.2013.06.007

Rahayu, R., & Day, J. (2015). Determinant Factors of E-commerce Adoption by SMEs in Developing Country: Evidence from Indonesia. *Procedia - Social and Behavioral Sciences*, *195*, 142-150. doi:10.1016/j.sbspro.2015.06.423

Rebollo, O., Mellado, D., Fernández-Medina, E., & Mouratidis, H. (2015). Empirical evaluation of a cloud computing information security governance framework. *Information and Software Technology*, *58*, 44-57. doi:10.1016/j.infsof.2014.10.003

Sharma, S. K., Al-Badi, A. H., Govindaluri, S. M., & Al-Kharusi, M. H. (2016). Predicting motivators of cloud computing adoption: A developing country perspective. *Computers in Human Behavior*, *62*, 61-69. doi:10.1016/j.chb.2016.03.073

Sularto, L., Wardoyo, & Yunitasari, T. (2015). User Requirements Analysis for Restaurant POS and Accounting Application Using Quality Function Deployment. *Procedia - Social and Behavioral Sciences*, *169*, 266-280. doi:10.1016/j.sbspro.2015.01.310

Tsai, A. C., Kohrt, B. A., Matthews, L. T., Betancourt, T. S., Lee, J. K., Papachristos, A. V., … Dworkin, S. L. (2016). Promises and pitfalls of data sharing in qualitative research. *Social Science & Medicine*, *169*, 191-198. doi:10.1016/j.socscimed.2016.08.004

Ali, Mazhar & U. Khan, Samee & Vasilakos, Athanasios. (2015). Security in Cloud Computing: Opportunities and Challenges. Information Sciences. 305. . 10.1016/j.ins.2015.01.025.