



IT Sophistication: Implementation on State Owned Banks in Indonesia

Sambas Ade Kesuma^{1*}, Siti Zabedah Saidin², Aidi Ahmi³

¹Tunku Puteri Intan Safinaz School of Accountancy, Universiti Utara Malaysia, Kedah, Malaysia, ²Tunku Puteri Intan Safinaz School of Accountancy, Universiti Utara Malaysia, Kedah, Malaysia, ³Tunku Puteri Intan Safinaz School of Accountancy, Universiti Utara Malaysia, Kedah, Malaysia. *Email: sambas.usu@gmail.com

ABSTRACT

The objective of this paper is to determine the IT sophistication (technological, informational, functional, and managerial sophistication) implementation among the Indonesian state owned bank. The result of this survey shows that shows a relatively high level on the implementation of IT sophistication on state owned banks in Indonesia. The result of this study shows a high level of technological sophistication among the Indonesian state owned banks. The majority of state owned banks have adopted high technologies, high level of informational sophistication, high participation on information system development (functional sophistication), and high plan on information system development (managerial sophistication) on state owned banks in Indonesia. The result of this study would contribute to the development of IS research, particularly to extend the use of comprehensive dimension of IT sophistication dimension in banking sector and provide information that would help the managements of state owned banks to improve the implementation of IT.

Keywords: IT Sophistication, Technological Sophistication, Informational Sophistication, Functional Sophistication, Managerial Sophistication, State Owned Banks, Indonesia

JEL Classifications: M15, L86

1. INTRODUCTION

The banking industry is becoming more expansive in developing information technology (IT) systems to improve efficiency and working on the new market segment that requires speed and convenience of transaction. The use of IT in the modern banking industry is also becoming important, both as a strategic infrastructure and also in terms of competitive advantage (Dangolani, 2011). In its implementation, the banking sector needs to utilize the sophistication of IT to improve the efficiency of operational activities, improving the quality of banking services to its customers and enhance the competitiveness of the Banks. IT supports the expansion of the banking office network to reach remote areas and connected to the centralized core banking system and other banking application systems as well as enabling transactions to be executed online (Dangolani, 2011).

Indonesia is one of the largest country in the Southeast Asian region with the largest population which is about 250 million (Otoritas Jasa Keuangan Indonesia, 2014). This condition would create a potentials business for Indonesian state owned banks to improve. Indonesian state owned banks are government financial institutions which provide commercial banking for public (Marsuki et al., 2012). Currently, IT developments on state owned banks in Indonesia is intended to offer convenience, flexibility, and encourage the potential for a variety of business opportunities. Thus, this paper seeks to investigate to what extent these IT developments have been implemented by Indonesia state owned banks. Specifically, this paper will look into the level of IT sophistication implementation into a few dimensions that will discussed in the following section.

This paper is organized as follows. Section 2 discusses about the current implementation of IT and the challenges faced by

Indonesian state owned banks. Section 3 covers IT sophistication dimensions as part of the instruments development for the research framework. Section 4 presents a method used in this study, while Section 5 provides the preliminary findings of the study. Section 6 summarizes the findings, set of the limitations of the study and provides implication for future research.

2. IT IMPLEMENTATION ON STATE OWNED BANKS IN INDONESIA

According to Bank Indonesia (2010), by the end of 2013, there were 120 commercial banks, with 18.144 offices operating throughout Indonesia. Moreover, there are 1.639 rural banks with 4.656 offices spread throughout Indonesia (Bank Indonesia, 2010). State owned banks in Indonesia need to take advantage of the sophisticated IT in order to improve the efficiency of operational activities to improve the quality of banking services to its customers and to enhance the competitiveness of the bank. Currently, IT developments on state owned banks in Indonesia is intended to serve convenience, flexibility, and encourage the potential for a variety of business opportunities. IT support also becomes necessary in order to improve the capability of state owned banks in providing contribution to create value added service excellence and effective operational implementation. Most of state owned banks use the banking technology such as Automated Teller Machine (ATM), banking application system, real time gross settlement system, electronic clearing system, and internet banking (Almilia and Brilianties, 2010).

Bank Indonesia uses Banking Information System Technology terms for all information and communication technology applied in banking services. One of the popular IT applications on state owned banks is the electronic banking. Electronic banking covers a wide area of sophisticated technologies, some of which is related to the frontline banking services and back end services. Frontline banking service such ATM and banking computerization system (mobile banking and internet banking), and back end services related to the technology used by financial institutions, merchant or provider of transaction services (such as electronic check conversion) (Almilia and Brilianties, 2010).

Bank Indonesia provide guidance regarding the implementation of risk management in the use of IT on banking. Bank Indonesia (2010) requires that the IT committee should establish IT strategic plan and banking policies related to the use of IT in every state-owned bank and ensure that:

- The use of IT to support the business development, the achievement of the state-owned Bank's business objectives and continuity of service to customers.
- There are efforts to increase the competency of human resources related to the use of IT.
- Implementation of risk management processes in the use of IT implemented adequately and effectively.
- Availability of adequate IT policies and procedures on every state-owned bank and IT users.
- There is a performance measurement system for the IT implementation process.

3. IT SOPHISTICATION DIMENSIONS

Previously, research on IT adoption in an organization started from the study conducted by Nolan in early 70's. The study was examined the relationship between the stages and the preceding stage, also known as stages of the electronic data processing growth model. This study was successfully integrated the aspects of IT usage including the type of technology used and the nature of the applications portfolio and management information system which also include organization, the IS plan and control (Raymond and Pare, 1992). The Nolan's study encouraged other researchers to validate the Nolan model. In the next step, many researchers continue to investigate the characteristics of information system within organizations, especially IT sophistication (Raymond and Pare, 1992).

Previous IS researchers, Keen (1991) and Weill and Broadbent (1998) viewed IT sophistication as an essential resource of an organization. Raymond (1998), defined the IT sophistication as processing model, type of operation, application portfolio, decision level, the position of IS function. Cheney and Dickson (1982) categorized IT sophistication into three main criteria: (1) technological sophistication that reflects the hardware and software systems, and nature of the application, (2) organizational sophistication that reflects the information resources for management activities, and (3) system performance. Based on previous studies, it can be concluded that the concept of IT sophistication is a multidimensional concept. In order to integrate these concepts, Raymond and Pare (1992) proposed the integration of the IT sophistication variables namely information content, technology support, functional support, management information system.

Table 1 presents several indicators of each IT sophistication variables. Raymond and Pare (1992) defined IT sophistication

Table 1: IT sophistication indicators

| Dimension | Indicator |
|------------------------------|---|
| Informational sophistication | Application portfolio Integration of application |
| Technological sophistication | Variety of IT used Hardware characteristics Development tools Man-machine interface Processing mode |
| Functional sophistication | Type of operation IS personnel specialization The role of the IS function Decisional level Type of development The position of the IS function User participation |
| Managerial sophistication | Organizational objective Top management implication IT investment IT adoption process Presence of consultants IT planning process Control of IT Evaluation of IT |

as the nature, complexity and interdependence of the use of IT (information content and technology support) and IT management (functional support and managerial support) in the organization. Another definition proposed by Wang et al. (2004) that IT sophistication is the extent of IT use, intensity of IS use and IT integration. Thus, IT sophistication includes several platform technologies such as hardware and software, networking and telecommunications technologies, database and various shared services such as electronic data interchange, e-mail, universal file access, video conferencing and teleconferencing services (Al-Eqab and Adel, 2013).

Literature provide various ways of the technological sophistication such as variety of IT used hardware characteristics (Raymond and Pare, 1992). Informational dimension of IT sophistication includes the type of application portfolio (advanced applications) such as order entry, budget variances, production variances, budgeting, production planning and control, and activity-based costing) and integration of these applications (Al-Eqab and Adel, 2013). The use of these advanced applications will lead to more information available and faster to retrieve (Al-Eqab and Adel, 2013). Meanwhile, several researchers have used many dimensions such as decision level and user participation to represent functional sophistication (Raymond and Pare, 1992; Al-Eqab and Adel, 2013). Raymond and Pare, (1992) and Choe (1996) found a significant positive relationship between user participation and information system implementation.

The user participation in an information system implementation may consist of participation in programming, participation in system maintenance and problem solving, elaboration of development schedule, elaboration of development budget, and training of new users on available system (Al-Eqab and Adel, 2013). The managerial sophistication has been utilized in the literature in certain ways such as top management support, IT investment, IT adoption process, control of IT, and evaluation of IT (Al-Eqab and Adel, 2013; Al-Eqab and Ismail, 2011). The top management support is the most dominant managerial sophistication dimension that have a significant implication on information system implementation (Al-Eqab and Ismail, 2011).

Further, top management may determine the success of an information system projects because they play an important role in information system planning such as financial resource planning, human resource planning, information requirement planning, implementation planning, and post implementation planning (Al-Eqab and Ismail, 2011).

The IT sophistication dimensions that have been proposed by Raymond and Pare (1992) was originally developed in the SME context. However, several recent studies have attempted to apply the dimensions of IT sophistication in different contexts, such as health care organization context (Pare and Sicotte, 2001), manufacturing listed on the stock exchange (Al-Eqab and Adel, 2013), cooperative context (Alannita and Suaryana, 2014), manufacturing SMEs (Raymond et al., 2014) and listed companies (Al-Eqab and Ismail, 2011). This is accordance with Raymond and Pare (1992) suggestion, that the dimensions of IT sophistication are

not only limited to small and medium organization but also large scale business may also use these dimensions. It is based on this assumption that almost all organizations have used technology and computer-based information systems and also IT sophistication is a multidimensional concept and provides a comprehensive IT characterization for accounting information system research (Al-Eqab and Adel, 2013; Ismail, 2004).

4. METHOD

The objective of this paper is to determine the implementation of IT sophistication in term of technological, informational, functional, and managerial sophistication among the Indonesian state owned bank. The questionnaires were distributed to 239 accounting staff on state owned bank in Indonesia and 183 was returned. The response rate was about 79.5% out of distributed banks. The accounting staffs are selected because this group is one of the key players in the information system implementation in most state-owned banks in Indonesia. The measurements of the technological sophistication, informational sophistication, functional sophistication, and managerial sophistication were adopted from previous studies of Raymond and Pare (1992), Al-Eqab and Adel (2013), and Pare and Sicotte (2001).

5. RESULTS

5.1. Demographic Profiles

Table 2 indicates that fairly balanced between genders, male (48.6%) and female (51.4%). The age of respondents mostly between 25 and 30 years old (26.8%), and 36 to 40 years old (25.1%). The majority of respondents (66.1%) having bachelor degree, and 29.5% is master degree. Further, 30.1% of the respondents had working experienced between 2 and 5 years,

Table 2: Demographic result

| Demographic characterises | Total (%) |
|-----------------------------|------------|
| Gender | |
| Male | 89 (48.6) |
| Female | 94 (51.4) |
| Age | |
| Below 25 years old | 30 (16.4) |
| Between 25 and 30 years old | 49 (26.8) |
| Between 31 and 35 years old | 46 (25.1) |
| Between 36 and 40 years old | 26 (14.2) |
| Between 41 and 45 years old | 17 (9.3) |
| Above 45 years old | 15 (8.2) |
| Education level | |
| Bachelor degree | 121 (66.1) |
| Master degree | 54 (29.5) |
| Other | 8 (4.4) |
| Experience | |
| <2 years | 47 (25.7) |
| 2-5 years | 55 (30.1) |
| 5-10 years | 43 (23.5) |
| 10 years above | 38 (20.8) |
| Position | |
| Assistant supervisor | 32 (17.5) |
| Manager | 3 (1.6) |
| Staff | 131 (71.6) |
| Supervisor | 17 (9.3) |

25.7% had <2 years of experience and 23.5% had experience between 5 and 10 years. Most of respondents work as regular staff (71.6%), assistant supervisor (17.5%), supervisor (9.3%) and only 1.6% as manager.

5.2. Types of IT Implementation

Table 3 presents the type of technologies adopted by the respondent banks. The results in Table 3 shows that more than 95% of the banks use transaction processing system, electronic funds transfer (EFT), electronic banking, and local area network. About 96.2% of the banks utilize database system, and 97.3% use accounting system. 65% of the banks also use office support systems. <50% banks use customer relationship management (CRM) (35.5%), decision support system (25.1%), and 20.8% using enterprise resource planning.

5.3. Computer Applications

The result in Table 4 shows that more than 95% of the banks use all accounting application such as general ledger, accounts receivable, financial accounting, accounts payable, and payroll. About 90.2% banks use financial analysis. More than 80% banks use cost accounting (89.1%), billing (88.5%) and project management (82.5%).

Table 3: Type of technologies

| Type of Technologies | Total (%) |
|-------------------------------|-------------|
| Office support system | 119 (65.0) |
| Decision support system | 46 (25.1) |
| Transaction processing system | 183 (100.0) |
| EFT | 183 (100.0) |
| Electronic banking | 183 (100.0) |
| Database system | 176 (96.2) |
| Accounting system | 178 (97.3) |
| ERP | 38 (20.8) |
| CRM | 65 (35.5) |
| LAN | 183 (100.0) |

EFT: Electronic funds transfer, ERP: Enterprise resource planning, CRM: Customer relationship management, LAN: Local area network

Table 4: Computer applications

| Computer Applications | Total (%) |
|---------------------------------|-------------|
| General ledger | 183 (100.0) |
| Cost accounting | 163 (89.1) |
| Accounts receivable | 183 (100.0) |
| Financial accounting | 183 (100.0) |
| Accounts payable | 183 (100.0) |
| Financial analysis | 165 (90.2) |
| Billing | 162 (88.5) |
| Budgeting | 144 (78.7) |
| Order entry | 79 (43.2) |
| Project management | 151 (82.5) |
| Purchasing | 92 (50.3) |
| Production Variances | 144 (78.7) |
| Inventory | 143 (78.1) |
| Budget variance | 145 (79.2) |
| Production planning and control | 75 (41.0) |
| Modelling | 76 (41.5) |
| Payroll | 183 (100.0) |
| Personnel management | 138 (75.4) |
| Activity-based costing | 53 (29.0) |
| Balanced scorecard | 102 (55.7) |

Further, 79.2% banks use budget variance, budgeting (78.7%), production variances (78.7%), inventory (78.1%), and personnel management (75.4%). About 55.7% use balance scorecard and 50.3% use purchasing. Less than 50% use order entry, production planning and control and modelling.

5.4. Level of Participation in IS Development

The level of participation in information system development is a criterion variable used to measure the functional sophistication. Overall, the participation level in information system development within the state-owned banks in Indonesia as shown in Table 5 is moderate and high participation, since the accounting staff together with IT staff involved in the implementation of information system in most state-owned banks in Indonesia. About 53.6% (moderate), 33.9% (high participation), 2.7% (highly participation), and only 9.8% (less participation) respondents participate in information systems planning. 43.2% (high participation) staff participate in develop applications, while 42.6% (moderate), 7.1% (less participation), and 7.1% (very high participation) respondents participate in develop applications.

Majority of respondents indicate high participation (47%) on elaboration of development schedule, about 42.1% respondents on moderate level in elaboration of development schedule, and <10% on less participation (7.7%) and very high participation (3.3%) respondents participate on development schedule elaboration. On elaboration of development budget, about 44.3% respondents indicate a high participation, 42.6% in moderate, and <10% on less participation (9.3%) and very high participation (3.3%). About 45.9% of respondents indicate high participation as an active members of system development member, 39.3% moderate, 9.3% less participation, and 5.5% very high participation. The majority of respondents indicate high participation (47.5%) in new users training on available systems, 38.3% moderate, <10% in less participation (7.1%) and very high participation (4.9%) on new user training.

5.5. Level of Planning in IS Development

The level of planning in information system development was used to measure the managerial sophistication. Table 6 shows the high plan in information system development on the most state-owned banks in Indonesia. About 48.1% (high plan), 39.3% (moderate), and 11.5% (highly planned) on financial resources planning. 68.9% (high plan), 27.3% (moderate), and about 3.8% (highly planned) on human resources plan. Meanwhile, 70.5% (high plan), 23% (moderate), and only 6.6% (highly planned) on information requirement planning. Further, about 56.8% (high plan), 39.9% (moderate), and 2.7% (highly planned) in implementation planning. On the post implementation planning, 49.2% (high plan), 43.7% (moderate), and 6.6% (highly planned).

6. CONCLUSIONS

IT developments in the banking industry is always moving fast. Along with the rapid development, banking industry in Indonesia is required to catch up with these developments. In its implementation, the Banking sector needs to utilize sophisticated

Table 5: Level of participation in IS development

| Level of Participation | Total (%) | | | | | |
|------------------------|------------------------------|--|-------------------------------------|-----------------------------------|--------------------------------------|--------------------------------------|
| | Participation in IS planning | Participation in application development | Elaboration of development schedule | Elaboration of development budget | Active members of system development | Train new users on available systems |
| 1* | 0 (0) | 0 (0) | 0 (0) | 1 (0.5) | 0 (0) | 4 (2.2) |
| 2 | 18 (9.8) | 13 (7.1) | 14 (7.7) | 17 (9.3) | 17 (9.3) | 13 (7.1) |
| 3 | 98 (53.6) | 78 (42.6) | 77 (42.1) | 78 (42.6) | 72 (39.3) | 70 (38.3) |
| 4 | 62 (33.9) | 79 (43.2) | 86 (47) | 81 (44.3) | 84 (45.9) | 87 (47.5) |
| 5 | 5 (2.7) | 13 (7.1) | 6 (3.3) | 6 (3.3) | 10 (5.5) | 9 (4.9) |
| Σ | 183 (100) | 183 (100) | 183 (100) | 183 (100) | 183 (100) | 183 (100) |

*1: No participation, 2: Less participation, 3: Moderate, 4: High participation, 5: Very high participation

Table 6: Level of planning in IS development

| Level of Planning | Total (%) | | | | |
|-------------------|------------------------------|--------------------------|----------------------------------|-------------------------|------------------------------|
| | Financial resources planning | Human resources planning | Information requirement planning | Implementation planning | Post implementation planning |
| No plan | 1 (0.5) | 0 (0) | 0 (0) | 0 (0) | 0 (0) |
| Less plan | 1 (0.5) | 0 (0) | 0 (0) | 1 (0.5) | 1 (0.5) |
| Moderate | 72 (39.3) | 50 (27.3) | 42 (23) | 73 (39.9) | 80 (43.7) |
| High plan | 88 (48.1) | 126 (68.9) | 129 (70.5) | 104 (56.8) | 90 (49.2) |
| Highly planned | 21 (11.5) | 7 (3.8) | 12 (6.6) | 5 (2.7) | 12 (6.6) |
| Total | 183 (100) | 183 (100) | 183 (100) | 183 (100) | 183 (100) |

IT to improve the efficiency of operational activities, improve the quality of banking services to its customers, and enhance the competitiveness of the Banks.

The result of this survey shows that a relatively high level on the implementation of IT sophistication on state owned banks in Indonesia. The result shows a high level of technological sophistication among the Indonesian state owned bank. The majority of state owned banks have adopted high technologies on banking technology (electronic banking, EFT, transaction processing system), networking, database system, accounting system, office system, CRM, decision support system and enterprise resource plan. The result also shows that state owned banks in Indonesia have high level of informational sophistication.

The state-owned banks have adopted all accounting applications and other application to support accounting and banking application. The level of functional sophistication shows a relatively high participation on information system development. Most of accounting staff on state owned banks participate on information system development. Moreover, the level of managerial sophistication also shows a high plan on information system development on state owned banks. Thus, it is expected that state-owned banks in Indonesia can maintain its high level of IT sophistication and continuously improve the quality of its IT in order to provide excellent service to its customers and also help to improve the operational activities of these banks.

There are two important implications from this study. First, banks should consider other aspects such as functional and managerial sophistication as also important in addition to technological and informational sophistication in state owned banks information system implementation. Second, this survey provides the level of informational, technological, functional and managerial sophistication in state owned banks in Indonesia. This will be

useful for the improvement of information systems in state-owned banks and improve the quality of service to customers.

This study only determines the implementation of technological sophistication, informational sophistication, functional sophistication and managerial sophistication on state owned banks in Indonesia, future study may include the private banks, regional development banks and rural banks. This study only focusses on one indicator on functional sophistication (level of participation on information system development) and managerial sophistication (level of information system planning), future study can use another indicator such as personnel specialization, decisional level, IT investment, control of IT, and evaluation of IT. The respondents of this study only focus on accounting staff on state owned banks in Indonesia, future study may include another group such as IT staff or financial staff.

REFERENCES

- Alannita, N.P., Suaryana, I.G.N. (2014), Pengaruh kecanggihan teknologi informasi, partisipasi manajemen, dan kemampuan teknik pemakai sistem informasi akuntansi pada kinerja individu. *E-Jurnal Akuntansi Universitas Udayana*, 6(1), 33-45.
- Al-Eqab, M., Adel, D. (2013), The impact of IT sophistications on the perceived usefulness of accounting information characteristics among Jordanian listed companies. *International Journal of Business and Social Science*, 4(3), 145-155.
- Al-Eqab, M., Ismail, N.A. (2011), Contingency factors and accounting information system design in Jordanian companies. *IBIMA Business Review*, 2011, 1-13.
- Almilia, L.S., Brilliantien, I. (2007), Faktor-Faktor yang Mempengaruhi Kinerja Sistem Informasi Akuntansi Pada Bank Umum Pemerintah di Wilayah Surabaya, *Proceeding Seminar Nasional Ilmu Komputer dan Teknologi Informasi (SNIKTI)*. Jakarta: Universitas Indonesia.
- Bank Indonesia. (2010), *The dynamics of banking transformation in Indonesia*. Indonesia: Publikasi Bank.

- Cheney, P.H., Dickson, G.W. (1982), Organizational characteristics and information systems: An exploratory investigation. *Academy of Management Journal*, 25, 170-184.
- Choe, J.M. (1996), The relationships among performance of accounting information systems, influence factors, and evolution level of information systems. *Journal of Management Information Systems*, 12(4), 215-239.
- Dangolani, S.K. (2011), The impact of information technology in banking system (A case study in Bank Keshavarzi Iran). *Procedia - Social and Behavioral Sciences*, 30, 13-16.
- Ismail, N.A. (20014), AIS Alignment and Firm Performance in SMEs, PhD Thesis. UK: Loughborough University.
- Keen, P.G.W. (1991), *Shaping the Future: Business Design Through Information Technology*. Boston, MA: Harvard Business School Press.
- Marsuki, M., Pahlevi, C., Pono, M. (2012), Perbandingan kinerja keuangan bank pemerintah dan bank swasta. *Jurnal Analisis*, 1(1), 66-72.
- Otoritas Jasa Keuangan Indonesia. (2014), Aspek pendanaan dan dukungan perbankan pada pembangunan infrastruktur telekomunikasi. [Aspects of funding and banking support on the development of telecommunications infrastructure]. Departemen Penelitian dan Pengaturan Perbankan.
- Pare, G., Sicotte, C. (2001), Information technology sophistication in health care: An instrument validation study among Canadian hospitals. *International Journal of Medical Informatics*, 63, 205-223.
- Raymond, L. (1988), The sophistication of information systems context SMEs: An approach from the application portfolio. *Canadian Journal of Administrative Sciences*, 5(2), 32-39.
- Raymond, L., Croteau, A.M., Bergeron, F. (2011), The strategic role of IT as an antecedent to the IT sophistication and IT performance of manufacturing SMES. *International Journal on Advances in Systems and Measurements*, 4(3), 203-211.
- Raymond, L., Pare, G. (1992), Measurement of information technology sophistication in small manufacturing businesses. *Information Resources Management Journal*, 5(2), 4-16.
- Wang, Y.C.W., Chang, C.W., Heng, S.H.M. (2004), The levels of information technology adoption, business network and a strategic position model for evaluating supply chain integration. *Journal of Electronic Commerce Research*, 5(2), 85-98.
- Weill, P., Broadbent, M. (1998), *Leveraging the New Infrastructure: How Market Leaders Capitalize on Information Technology*. Boston: Harvard Business School Press.