

When More is Less: The Case of Disconnected Information Systems in Indonesian Public Health Facilities

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Abstract. The clear majority of previous studies have found that the absence of information systems to properly manage data is one of the main challenges in improving public health management. The present study offers an alternate perspective, revealing other emerging problems in cases where there are many information systems in place but without sufficient orchestration. The national government of Indonesia has been coercive in its implementation of various information systems without involving users at public health facilities, which has created many problems on the ground. The problems identified relate to the quality of the disconnected information systems currently in use, the lack of human resource development, unclear procedures, uncoordinated reports and the absence of an incentive scheme. The present study also highlights some practical implications, including the use of a more holistic perspective in designing and developing an integrated public health information infrastructure.

Keywords: system integration, silo thinking, health information system, information infrastructure, Indonesia, developing countries.

1. Introduction

Several previous studies have reported several challenges in managing public health in developing countries, and Indonesia is no exception. These challenges include weak healthcare systems and under-resourced facilities (Cline & Luiz, 2013). The use of information systems in this sector has been advocated, as they can help improve the quality of healthcare services and policies (Blaya, Fraser, & Holt, 2010; Cline & Luiz, 2013; Pappaioanou et al., 2003). From the literature, we can see that the absence of properly managed data contributes to poor policy formulation in the health sector (Pappaioanou et al., 2003).

The present study focuses on contexts in which various information systems are in place. The intriguing question regarding such cases is: Does the existence of information systems really contribute to better quality public health management? As measuring quality is not straightforward, we instead seek to answer the following question in this study: How are information systems used and managed in Indonesian public health facilities (called Pusat Kesehatan Masyarakat, or Puskesmas)? Answering this question will also provide insights to the former question. To achieve this, we conducted an interpretive case study involving several public health facilities in Indonesia.

The remainder of the paper is structured as follows. The second section provides a concise review of literature on the area of concern (i.e. the use of information systems in managing public health). In the third section, we describe the research context and methods. We present the research findings in the



fourth section, which are then discussed in the fifth section. The paper ends with conclusions and recommendations.

2. Literature Review

From previous studies, we can observe that the application of information technology (IT) in healthcare varies, from personal use to institutional purposes. The present study focuses on the latter. An example of a system for personal use is the 'assisted living support system', designed to help the elderly during the medication period (Šabanović, Chang, Bennett, Piatt, & Hakken, 2015), to help patients confirm their diagnoses (Owens, 2015), or to support health education (Harpe, Town, & Africa, 2012). Meanwhile, the use of IT in institutions covers a variety of purposes, including to improve efficiency in data-sharing among the stakeholders (Woźniak, Romanowski, Yantaç, & Fjeld, 2014) and to support communication (Bowen, Dearden, Wright, Wolstenholme, & Cobb, 2010).

More specifically, the present study focuses on the use of data to support policy modelling, which has been deemed very important to improving the quality of decision making in public health (Pappaioanou et al., 2003; Sutcliffe & Court, 2005). Our search into the literature revealed two complementary approaches in policy modelling: evidence-based (Sutcliffe & Court, 2005) and through 'eParticipation' involving a group of people (Macintosh, 2004). The former uses evidence from the field to formulate policies, while the latter invites citizens to participate by providing their opinions.

There are several stages in policy modelling. The first stage is agenda setting, followed by policy construction, implementation and, finally, evaluation (Sutcliffe & Court, 2005; Young & Quinn, 2002). To formulate effective policies, in all stages, the interests of the stakeholders should be taken into thoughtful consideration. Nevertheless, many factors affect the quality of policies, in addition to the technical ones. These factors include the experience of the stakeholders, resource availability, organisation values, lobbying activities, pressures from certain groups, pragmatism, legal aspects, media pressure and even luck (Davies, 2004; Zardo, Collie, & Livingstone, 2014).

The present study is considered a preliminary step towards effective policy formulation, focusing on mapping the use of information systems in Indonesian public health facilities, which is needed for policy construction. In this case, an integrated system is a necessity (De Kadt, 1989); otherwise, the systems in place will be fragmented and overlapping, which is often what happens in some national contexts (Okunzi & Macrae, 1995).

3. Research Method

The present research is an interpretive case study (Walsham, 1995). Stories and knowledge from the stakeholders comprise the main sources of data. To elicit this information, we interviewed five key actors across three public health facilities, lasting for four hours altogether. The interviewees are knowledgeable operators of information systems and have various backgrounds, including staff from the medical records, administrative, and nutritional departments. The data collection was carried out in early August 2017. This represents the preliminary data collection activities before a mass survey is conducted (in our future study).

We decided to analyse the qualitative data in a group discussion, involving the four authors of the present study, to gain further meaningful insights. Our accumulated knowledge is very beneficial in interpreting the data. One of us has extensive experience in developing and implementing information systems for hospitals in various regions. Another is strongly familiar with similar problems, especially related to the implementation of financial information systems in the public health facilities of Indonesia. Interpreting the data was not straightforward, instead requiring several rounds of analysis. Through this, new interpretations emerged and were then compiled to form a more complete picture.

4. Findings

Our analysis of the data offered many interesting and important insights, although they should be considered preliminary in nature. First, we found various information systems in place. One of our interviewees reported that every health facility operated 15 information systems. Most are supplied by

a national government agency, which, in this case, is the Ministry of Health. The problems experienced by the health facility now are primarily concerned with how to run all these information systems at the same time and with limited resources.

Second, in this context, the nonexistence of information systems is not the problem. Rather, the problem emerges when those systems are not well orchestrated. The systems do not help the staff accomplish their duties, and the system becomes a burden because the operators on the ground must enter the same data into more than one system. Data duplication, therefore, has become an issue.

Third, the problem could be becoming worse, as we found that public health facilities were never involved in the design and development of the information systems they use. This was obviously a top-down decision, and no attention was made to discern technical requirements from the operators' perspectives. For example, one interviewee reported that the health facility stopped using the Sistem Informasi Kesehatan Daerah (SIKDA, the Indonesian regional health information systems), since the system cannot accommodate policies made by the Badan Penyelenggara Jaminan Sosial (BPJS, the Healthcare and Social Security Agency of Indonesia), in which patients are exempt from all the expenses they may incur.

Fourth, it can be understood that various information systems demand capable human resources to manage them. Unfortunately, all our interviewees admitted that they face problems in this regard. Most of the operators have no training nor background in IT. The facilities worked around this by assigning the responsibilities of managing certain information systems to specific people. One of our interviewees stated, 'One staff member may be assigned one to two information systems to manage'.

Fifth, the situation depicted above led us to the conclusion that, in the field, the staff member who should be responsible for operating the information systems is unclear. We found that each health facility has only one staff member with an educational background in IT. Hence, it is not difficult to imagine that all the information systems are beyond that staff member's capacity to manage.

Sixth, our interviews revealed that various reports should be regularly submitted by the health facilities. The reports are related to, for example, financial statements, immunisations, pilgrimage (hajj), clinical patients and special reports (e.g. HIV incidents). However, some of the information systems cannot produce a ready-to-send report format. Instead, the assigned operator must compile the reports manually. Some reports are submitted in print, while others can be uploaded into a shared storage folder on Google Drive.

Seventh, although we found that the reports are verified, there is no standardised verification procedure. For example, one of our interviewees reported that the data contained in the submitted report can be revised by sending a message through a WhatsApp group. This hinders the traceability of data versions and exchange.

Finally, even though the assigned operators have additional duties in addition to their official ones, no incentive wages are paid to them. From the perspective of human resource management, this is not a good practice for ensuring sustainability and increasing staff morale.

5. Discussion

The findings presented reveal some significant issues that need further discussion. First, 'sectoral ego',¹ or silo thinking, is commonplace. This 'public secret' of the public-sector management in Indonesia has an extensive influence on the design and development of information systems. As a consequence, a series of disconnected information systems were produced with few changes made to properly integrate them. When the system was web-based, the introduction of a 'bridge', such as an application programming interface (API), could help better integrate the systems. To ensure the information systems provide optimal benefits in the future, increased cooperation in designing and developing the systems is required. One of our interviewees suggested that 'the systems should be crafted into a single system to provide more integrated data. However, this needs good infrastructure and qualified human resources.' Silo thinking has been found to be a great burden in many contexts (Bygstad, Hanseth, & Le, 2015).

¹

Various solutions have been recommended, such as implementing process thinking, defining standards and interoperability, developing enterprise resource planning (ERP)-like solutions and building enterprise architecture (EA) (Bygstad et al., 2015).

Second, it seems that developers of new information systems always start from scratch, neglecting the existing foundation (i.e. information systems currently in use that could be further developed). This neglect has led to a missed opportunity in developing the plethora of information systems currently available into an information infrastructure (e.g. Star & Ruhleder, 1996; Wahid, 2013). In addition, the lack of an integrated system creates further problems, such as high-energy-consuming reporting systems. One interviewee said, 'The report format should be unified'. Another interviewee unhappily criticised, 'If we use the application, we should be able to send the report immediately'.

6. Concluding Remarks

We have reported findings from the field about the use of information systems by public health facilities in Indonesia. Our impression is that, from the perspective of the system operators, there are many problems in the systems without any clear and well-designed solutions. These problems are related to the quality of the disconnected information systems currently in use, the lack of human resources, unclear procedures, uncoordinated reports and the absence of an incentive scheme.

These findings reveal some practical implications. A more holistic perspective is needed in the design and development of public health information systems. Silo thinking should also be minimised. Only through these methods can an integrated information infrastructure be initiated and developed. Equally important is the involvement of the operators on the ground, as they represent precious information sources for determining the technical requirements.

As this is a preliminary study, limitations are inherent. We will validate our findings by conducting a survey of around 100 health facilities located in various locations (e.g. urban, rural, etc.) to gain a more complete picture about the patterns of information-system use. The findings will provide further insights into the development of a better policy-modelling system.

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