Determinants Effectiveness of Information Technology Governance and IT Performance in Higher Education Institution (HEI): A Conceptual Framework

Anwar Fattah[1,2*], Hoga Saragih[3], Resad Setyadi[2]

[1] Department of Electrical Engineering Industrial Faculty, Universitas Balikpapan
East Kalimantan Indonesia.
[2] Information Communication & Technology (ICT), Asia E University Malaysia
[3] Department of Informatics Engineering , Universitas Bakrie
Jakarta Indonesia.

[*] Corresponding author:
Email: anwar.fattah@uniba-bpn.ac.id

Abstract.

The purpose of this article is to build a conceptual framework based on literature review that will be tested in future research related to Information Technology Governance (ITG). The results of the literature review allow for the construction of hypotheses into a conceptual framework. Furthermore, the study identifies mechanism that contribute to effectiveness IT governance based on past literatures, on this domain assesses mechanism ITG the influence between information technology performance and effectiveness Information technology governance .The conceptual framework will be tested among higher Education Institution (HEI) users for future research in Indonesia..

Keywords: Performance of ITG, Effectiveness ITG, Mechanism ITG, Higher Education.

1. INTRODUCTION

The management of a campus or college is very important, especially in today's competitive, modern era. Each college also has its own profile. And when we look at this profile, there are always, the advantages and achievements it has achieved. What makes a quality university is inseparable from its governance.

Information Technology (IT) is a very important aspect for higher education institutions (HEI) in both teachings, research, and administration. The managers of those intuitions are more and more aware that IT is a strategic tool for their institutions. On the other hand, IT Governance is getting attention from the practitioner and research side, given the need to govern IT extending the organization's strategy and objectives into IT. IT Governance helps to set clear expectations, to gain participation, open communications, establish accountability, and provide executive management oversight. Information technology governance (ITG), essentially defined as a set of decision-making structures, processes, and relational mechanisms [1] is an

organizational capability that plays a significant role in value delivery from information technology (IT) investments [2]–[4].

Though little research has been conducted into examining the performance effects of IT governance in the public sector [5], exceptions include [6]. These studies provide understanding about the specific practices implemented to provide effective IT governance [7], critical success factors for effective IT governance [6], and the moderating role of IT governance on the relationship between IT spending and cost efficiency.IT governance mechanisms in this study will identify the organizational factors that contribute to gain effective IT governance. The main problem is not adoption failure but effectiveness IT governance implementation failure. The organizations fail to employ the strategic alignment that combines IT and their business goals. As we know, the IT governance implementation is a complex process which more difficult to control. This research identifies the influential factors on effective IT governance that adapted from past literature.

Based on the past literature shown that most of the studies on IT governance were conducted in the business sector and private organizations, rather than in a public organization. IT governance implementation in higher education organization has different characteristics compared to private organizations. Unlike the business orientation, where investments aim to generate profit and financial different demands in terms of results. To fill this gap on IT governance study that focuses on a non-private sector considered as important research. This research attempts to examine the effectiveness of IT governance in the HEIs sector and promotes understanding of IT governance and performance in public organizations in the ways.

The purpose of the study is to propose the evaluation model of effective IT governance in the context of HEI. The model developed through reviewing past literature on the related variables that contributed to IT Governance and development. This result of the study can help HEIs management to identify the factors that influence effective IT Governance implementation. Although there have been many studies in the domain of the applied research framework of IT governance like COBIT, ITIL and others, most studies focus on industries and the business sector which the main objectives are how to create the profit from their business. This study looking at IT governance implementation in the university context in developing countries.

II. LITERATURE REVIEW

ITG involves a set of high-level definitions, such as principles, values and goals, operationalized through mechanisms [8]. Several authors argue that enterprises should implement ITG over the use of IT mechanisms[9], [10]. An ITG framework may be deployed using a set of mechanisms including struct ure, processes, and relational mechanisms [1], [3], [11], [12] Researchers [4], [11]–[14]. Propose that IT Governance can deployed enterprise governance of IT by using a holistic mixture of various structures, processes, and relational mechanisms.

The aim of IT governance mechanisms is to enhance business/IT alignment with the positive association of IT governance performance [15].
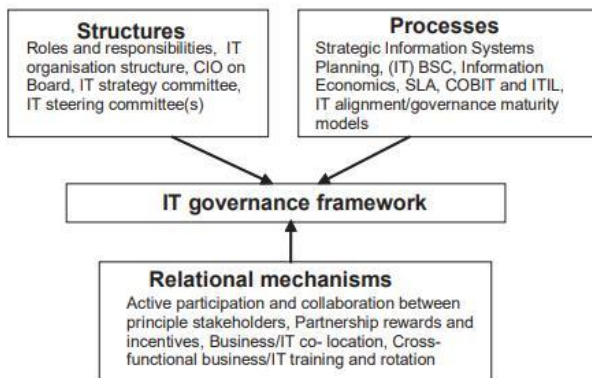

Figure 1 the Key Elemen of an IT Governance Framework

Structures mechanisms are responsible for defining roles and responsibilities for making IT decision and for enabling contacts between business and IT management decision-making functions. Steering committees are an example of those structures composed of directors, managers and executives, in other words, people responsible for decision-making in the organization [9], [14], [16].

Processes mechanisms involve the arrangement of formal decision making and the design of the forms for monitoring that the executing of IT operation is in accordance with the rules. Monitoring also provides inputs to decision making as regards investment proposals and evaluation processes, architecture exception processes, service levels agreements, chargeback, and others metrics. [9], [14], [16] .

Relational mechanisms include the active participation of, and collaborative relationship among, corporate executive, IT Management and business management. An appropriate communication and knowledge sharing with learning and coaching is important [9], [14], [16].

[13] as well as [17] demonstrate that solutions for ITG may depend on contingency factors such as: size of the organization, type of organization, regional differences, organizational structure, or strategy.

The challenge is to choose the right mechanisms to achieve better results. Among the literature, several authors argued that organizations should use ITG mechanisms [10], [12] but few researchers attempt to describe and provide a complete explanation of ITG mechanisms. Moreover, there is not a consensus about all the existent ITG mechanisms. The majority of the authors point a set of ITG mechanisms without justifying why those and not others, were selected [18].

Therefore, it is necessary to identify in each specific organization which are the suitable frameworks and tools to obtain satisfactory findings [12].

Finding out which mechanism is most suitable for a specific organization may depend on contingency factors such as type of organization, size of organization, and

country [19], [20] not only agree but also add the organization context, (public or private) type of organization and (external and internal) environment as contingency factors.

Different organizations need different solutions for IT governance [21]. A mechanism that may be appropriate for an organization in the financial industry may not be appropriate for an organization in other industry [12], [17], [22].

According to [23] the challenge for a specific sector as public universities is first to understand their real situation regarding IT governance and then define the right way to implement structures, processes and relational mechanisms to realize the full potential of IT to leverage research, teaching and knowledge transfer to society.

[24] observed the IT governance mechanisms used by Australian organizations, including the existence of an IT steering committee, centralization of IT decision-making activities and the involvement of senior management in IT. However, the study did not provide empirical support of the relationship of the three mechanisms to the level of effectiveness of IT governance.

All these types of ITG mechanisms are important and must be combined in order to create a holistic approach that promotes effective and efficient ITG throughout the organization.However, knowing what mechanisms exist is very important but not enough. It is necessary to understand the difference between them and have a clear definition of each ITG mechanisms[18].

III. RESEARCH DESIGN

Systematic literature search to conceptualize an IT Governance effectiveness framework adapted from approach Bryman's. Define the research question as tu guide the purpose of the review in first step. The second step establishes criteria to guide the secetion of studies through identification of appropriate databases for searches of the research context and use of relevant keywords. The third step synthesizes the literature review with the development of a conceptual framework.The research question is:

RQ1. What are the mechanism and impact of IT governance effectiveness in IT Performance in Higher Education institutions?

In this section, we indicate the bibliographic databases used in our search, inclusion, and exclusion of research article types, particularly evident in health research [25], [26] In information systems and management Research – specifically those that contribute to the development of conceptual Frameworks. Also [18], [20], [27], [28] research related mechanism ITG in higer education, finance industry and healthcare. Using the following online databases, the period for the literature search was December 2015-May 2020:

- Scholar Google.
- ACM.
- Ebscohost.

- Emerald.
- IEEE.
- Springer.
- Gale.
- Proquest.
- Science Direct

Since IT governance is traditionally a board room agenda, we suggest that other streams of research that are of relevance to IT governance include strategic information systems planning (SISP), strategic alignment maturity (SAM), information systems security, business-IT alignment, and International Organization for Standardization (ISO) in information systems. Thus, we used the following keywords, titles, and abstract in our literature search: IT governance, SISP, SAM, information systems security, business-IT alignment, and ISO information systems. Evaluating the research articles to answer our research question, we used journal articles, conference papers, and dissertations published between 2010 and 2020. We also viewed web sites referred to in the literature to gain further insights into IT governance. In subsequent sections, we discuss our findings from the literature review and synthesize development of a conceptual framework for IT governance effectiveness

IV. HYPOTHESIS DEVELOPMENT
4.1 Mechanism Information technology Governance

ITG involves a set of high-level definitions, such as principles, values, and goals, operationalized through mechanisms. Several authors argue that enterprises should implement ITG over the use of IT mechanisms [8], [9]. An ITG framework may be deployed using a set of mechanisms including structure, processes, and relational mechanisms [1], [8], [10], [11] Researchers [12] [3], [8]–[10], [13] Propose that IT Governance can deploy enterprise governance of IT by using a holistic mixture of various structures, processes, and relational mechanisms. Effective IT governance is crucial for an organization to achieve its corporate performance goals. To implement IT governance effectively, a set of IT governance mechanisms is required (e.g., IT steering committee, IT organizational structure) that encourages behaviors congruent with the organization's mission, strategy, values, norms and culture [14].

4.1.1 Structure mechanism

Structure mechanism are responsible for defining roles and responsibilities for making IT decisions and for enabling contacts between business and IT management decision-making functions. Steering committees are an example of those structures composed of directors, managers and executives, in other words, people responsible for decision-making in the organization [8], [9], [15]

[4], in research conducted in 256 public and private organizations around the world, found that different structural configurations bring different results for domain decisions related to IT principles, IT architecture, IT infrastructure, business and investment applications, and prioritization.

In other studies focusing on specific practices related to decision-making structures, however, authors have not found positive effects in terms of the use of decision-making structures. [5], for example, did not find a positive correlation in Australian public organizations between strategic committees and IT governance effectiveness.

However, as pointed out by [5], these results maybe due to the low maturity of organizations dealing with the formalization of roles and responsibilities for making IT decisions. Also, according to [16], organizations suffer from incomplete implementations of ITG mechanisms in practice, leading to suboptimal results.

H1. Structure mechanism has a positive effect on Effectiveness information technology governance (ITG).

4.1.2 Process mechanism

Process mechnism involve the arrangement of formal decision making and the design of the forms for monitoring that the executing of IT operation is following the rules. Monitoring also provides inputs to decision making as re-gards investment proposals and evaluation processes, ar-chitecture exception processes, service levels agreements, chargeback, and other metrics. [9], [14], [16]

H2. Process mechanism has a positive effect on Effectiveness information technology governance (ITG).

4.1.3 Relational mechanism

Relational mechanism include the active participation of, and collaborative relationships among, corporate executives, IT Management, and business management. Appropriate communication and knowledge sharing with learning and coaching is important (Van Grembergen & De Haes, 2009; Webb et al., 2006; Weill & Woodham, 2005)

H3. Relational mechanism has a positive effect on Effectiveness information technology governance (ITG).

4.2 Effectiveness ITG

The study of the effectiveness of IT governance mechanisms has resulted in the results of studies on how IT governance mechanisms affect the effectiveness of information technology governance [4], [14], [17].

Research by [18] examines the relationship between three governance mechanisms - the IT steering committee, the IT solution manager, and the IT investment portfolio management process and the effectiveness of IT governance. Using the method of sending questionnaires to 180 federal government employees, the results of the study show that there is a positive correlation between the IT steering committee and the IT solution manager and the effectiveness of IT governance. Meanwhile, the IT investment portfolio management process has a negative correlation with the effectiveness of IT governance.

[4] surveyed the CIOs of 256 companies in the US and identified fifteen of the most common IT governance mechanisms. Among these are the senior management committee (IS Steering Committee), the IT Executive Commission, the Architectural Commission, etc. [14] using 80 Auditors in Queensland, Australia, conducted a study to determine the effectiveness of IT governance mechanisms, revealing that the existence of three mechanisms (IT Steering Committee, senior management involvement in IT, and company performance measurement systems are positively correlated with the effectiveness of IT governance.

On the other hand, two other mechanisms (centralization of IT decision making and the position of IT functions within the organization) are not supported The study [14], uses only a relatively small sample size and involves one ISACA Chapter (Queensland Chapter), thereby limiting the external validity of the study results.

[5] Investigated information technology (IT) governance mechanisms in public sector organizations. They find that an effective IT strategy committee and a communication system that effectively disseminates policies and procedures both have a significant positive influence on the overall level of IT governance effectiveness while the IT Steering Committee, senior management involvement in IT, ethics/propriety culture, and measurement systems company performance has a negative effect on this study.

[17] Develop studies related to effective information technology governance. This study seeks to empirically examine the IT governance mechanisms that affect the overall effectiveness of information technology governance. Furthermore, this study examines the relationship between effective IT governance and IT outsourcing decisions in organizations, and the level of IT Intensity in the organization. [19] shows that there is a positive relationship between the effectiveness of information technology governance and information technology performance.

Assessing an enterprise or business unit governance performance by evaluating the effectiveness of IT governance in delivering foru objective weighted by their importance to the enterprise [20]

• Cost effective use of IT
• Effective use of IT for asset utilization
• Effective use of IT for growth

•   Effective use of IT for business flexibility

H4. Effective information technology governance (ITG) has a positive effect on Information technology Performance

4.3 Information Technology Performance

IT governance performance is the level of IT governance effectiveness or how effective IT governance is, that is, the regulation encourages the desired organizational behavior and ultimately the achievement of performance goals in the organization [20]–[23]. Effective IT governance requires senior managers to define the goals of company performance, and actively design governance that facilitates habits that fit those goals. This performance can be measured by the value of services provided by the IT organization from a business point of view. The easiest way to measure such performance in organizations was reported in a study by [11].

According [24] IT governance mechanisms is to enhance business/IT alignment with the positive association of IT governance performance. The impact of IT on organizational performance [13], [25] argues that IT performance is characterized by a high level of effective IT governance structures and processes [26] found a strong positive relationship between IT governance implementation and organizational performance. [29]do not find a direct effect of IT governance on IT investment performance, however, IT governance moderates the relationship between IT capital and IT investment. The study of [30] studied the correlation between IT governance and IT performance. Study of learning from practitioner experience came up with several ITG mechanisms that best describe the effectiveness of a tertiary institution in Malaysia

H5. Structure mechanism has a positive effect on Performance information technology
H6. Process mechanism has a positive effect on Performance information technology
H7. Relational mechanism has a positive effect on Performance information technology

4.4 ITG Effectiveness mediating variable between mechanism ITG and Information Technology Performance

Study from [31] testing the mediating role for IT governance between Information technology, whether IT Structure and/or IT Capabilities and organizational performance, whether financial or non-financial performance of Egyptian banks. Using random sampling method. ITG has been measured using: Structure, capabilities. and performance. This research suggests that ITG effectiveness is a mediating variable between ITG Structure, Capabilities and financial/non-financial performance. Thus there is a need to explore the nature of such mediating variable [28], [29]. Thus given this thinking, this study hypothesized that:

H8: ITG effectiveness is a mediating variable between Mechanism ITG and Performance information technology .

The Proposed Model

This evaluation model of effective IT Governance and Performance IT is derived from past studies [22], [32], [33]. In order to confirm the model, the significances of the relationship among the variables need to examine as the next step from this study. The proposed research model that will be used to examine the effective IT governance and Performance of Information technology can be seen as following

.There are three determinant mechanism information technology governance (ITG) consisting of Structure, Process and Relational.
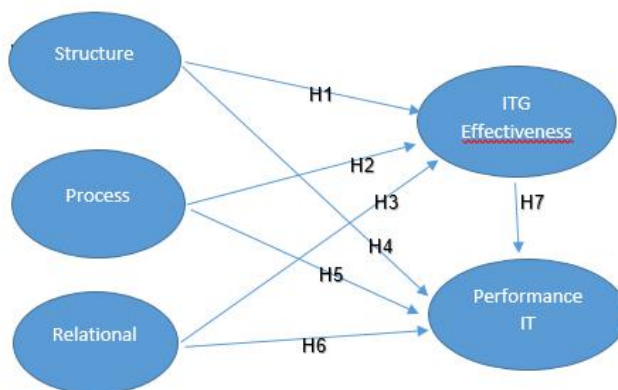
Mediating H8=H1+H2+H3+H7

Fig. 2 : Proposed conceptual framework

V. CONCLUSION

IT governance is a part of corporate governance cited as a means to help organizationsmanage risk and protect themselves from technology-related losses. The importance ofIT governance is evident through the attention it receives from scholar's andpractitioners. As noted previously, the focus of extant IT governance effectiveness research is separate from its link to determinants and impacts. Based on the conceptual framework and the building of hypotheses, the next research will examine the study identifies mechanism that contribute to effectiveness IT governance based on past literatures, on this domain assesses mechanism ITG the influence between information technology performance and effectiveness Information technology governance

For practitioners – especially board members, CEOs, CIOs, and those leading IT functions at senior and middle management levels – the framework offers insight determinants of IT governance effectiveness in Higher Education Institution (HEI). Practitioners have a better understanding of IT governance effectiveness and its

impact on IT performance. For researchers, the framework clarifies the contributing factors of IT governance and its impact; it provides opportunities for researchers to validate and test the framework. The results of validation will further contribute to knowledge in IT governance and its role in corporations.

VI. ACKNOWLEDGMENTS

REFERENCES

[1] R. Peterson, "Crafting information technology governance," *Inf. Syst. Manag.*, 2004, doi: 10.1201/1078/44705.21.4.20040901/84183.2.

[2] IT Governance Institute, *Board Briefing on IT Governance*. 2003.

[3] J. W. Ross and P. Weill, "How Top Performers Manage IT Decisions Rights for Superior Results," *IT Gov.*, 2004, doi: 10.2139/ssrn.664612.

[4] W. Van Grembergen, S. De Haes, and E. Guldentops, "Structures, Processes and Relational Mechanisms for IT Governance," in *Strategies for Information Technology Governance*, 2011.

[5] S. Ali and P. Green, "IT governance mechanisms in public sector organisations: An Australian context," *J. Glob. Inf. Manag.*, 2007, doi: 10.4018/jgim.2007100103.

[6] E. N. Nfuka and L. Rusu, "The effect of critical success factors on IT governance performance," *Ind. Manag. Data Syst.*, 2011, doi: 10.1108/02635571111182773.

[7] S. Ali, P. Green, and A. Robb, "Top management IT governance knowledge: A construct development," in *ACIS 2011 Proceedings - 22nd Australasian Conference on Information Systems*, 2011.

[8] G. C. Wiedenhöft, E. M. Luciano, and M. A. Macadar, "Information technology governance in public organizations: Understanding the expectations of its adoption through the lens of organizational citizenship," in *24th European Conference on Information Systems, ECIS 2016*, 2016.

[9] W. Van Grembergen and S. De Haes, *Enterprise governance of information technology: Achieving strategic alignment and value*. 2009.

[10] W. Peter and R. Jeanne, "A Matrixed Approach to Designing IT Governance," *MIT Sloan Manag. Rev.*, 2005.

[11] S. de Haes and W. van Grembergen, "An Exploratory Study into IT Governance Implementations and its Impact on Business/IT Alignment," *Inf. Syst. Manag.*, 2009, doi: 10.1080/10580530902794786.

[12] S. De Haes and W. Van Grembergen, "IT Governance and its Mechanisms," *Inf. Syst. Control J.*, 2004, doi: citeulike-article-id:9755150.

[13] P. M. A. Ribbers, R. R. Peterson, and M. M. Parker, "Designing information technology governance processes: Diagnosing contemporary practices and competing theories," in *Proceedings of the Annual Hawaii International Conference on System Sciences*, 2002, doi: 10.1109/HICSS.2002.994351.

[14] P. Weill and R. Woodham, "Don't Just Lead, Govern: Implementing Effective IT

Governance," *SSRN Electron. J.*, 2005, doi: 10.2139/ssrn.317319.

[15]   S. P. J. Wu, D. W. Straub, and T. P. Liang, "How information technology governance mechanisms and strategic alignment influence organizational performance: Insights from a matched survey of business and it managers," *MIS Q. Manag. Inf. Syst.*, 2015, doi: 10.25300/MISQ/2015/39.2.10.

[16]   P. Webb, C. Pollard, and G. Ridley, "Attempting to define IT governance: Wisdom or folly?," in *Proceedings of the Annual Hawaii International Conference on System Sciences*, 2006, doi: 10.1109/HICSS.2006.68.

[17]   A. E. Brown and G. G. Grant, "Framing the Frameworks: A Review of IT Governance Research," *Commun. Assoc. Inf. Syst.*, 2005, doi: 10.17705/1cais.01538.

[18]   R. Pereira, R. Almeida, and M. M. Da Silva, "IT governance patterns in the portuguese financial industry," in *Proceedings of the Annual Hawaii International Conference on System Sciences*, 2014, doi: 10.1109/HICSS.2014.541.

[19]   C. P. Armstrong and V. Sambamurthy, "Information Technology Assimilation in Firms: The Influence of Senior Leadership and IT Infrastructures," *Inf. Syst. Res.*, 1999, doi: 10.1287/isre.10.4.304.

[20]   R. Pereira, M. Mira da Silva, and L. V. Lapão, "Business/IT Alignment through IT Governance Patterns in Portuguese Healthcare," *Int. J. It/bus. Alignment Gov.*, 2014, doi: 10.4018/ijitbag.2014010101.

[21]   P. Subsermsri, K. Jairak, and P. Praneetpolgrang, "Information technology governance practices based on sufficiency economy philosophy in the thai university sector," *Inf. Technol. People*, 2015, doi: 10.1108/ITP-10-2013-0188.

[22]   S. De Haes and W. Van Grembergen, "Analysing the relationship between IT governance and business/IT alignment maturity," in *Proceedings of the Annual Hawaii International Conference on System Sciences*, 2008, doi: 10.1109/HICSS.2008.66.

[23]   M. Hicks, G. Pervan, and B. Perrin, "A case study of improving information technology governance in a university context," in *IFIP Advances in Information and Communication Technology*, 2010, doi: 10.1007/978-3-642-12113-5_6.

[24]   A. S. Sohal and P. Fitzpatrick, "IT governance and management in large Australian organisations," *Int. J. Prod. Econ.*, 2002, doi: 10.1016/S0925-5273(01)00184-0.

[25]   A. K. and N. A., "Chapter 2. Methods used for the systematic literature search and for the review of relevance, quality, and evidence of studies," *Scand. J. Public Heal. Suppl.*, 2004.

[26]   L. S. Robson and P. L. Bigelow, "Measurement properties of occupational health and safety management audits: a systematic literature search and traditional literature synthesis.," *Canadian journal of public health. Revue canadienne de santé publique*. 2010, doi: 10.1007/bf03403844.

[27]   I. S. Bianchi and R. D. Sousa, "IT Governance Mechanisms in Higher Education," in *Procedia Computer Science*, 2016, doi: 10.1016/j.procs.2016.09.253.

[28]   A. O. Tonelli, P. H. de Souza Bermejo, P. Aparecida dos Santos, L. Zuppo, and A. L. Zambalde, "It governance in the public sector: a conceptual model," *Inf. Syst. Front.*, 2017, doi: 10.1007/s10796-015-9614-x.

[29]   B. Gu, L. Xue, and G. Ray, "IT Governance and IT Investment Performance: An Empirical Analysis," *SSRN Electron. J.*, 2011, doi: 10.2139/ssrn.1145102.

[30]   H. Ajayi, B.A. Hussin, "ITG_in_University_Practitioners," *J. Theor. Appl. Inf.*

Technol., vol. 88, pp. 219–230, 2016.

[31]   M. Soliman and A. H. M. Zaky, "The Mediating Role of IT Governance Effectiveness between ITG and Financial/ Non-Financial Performance: Empirical Research on Egyptian Banking Sector," *SSRN Electron. J.*, 2018, doi: 10.2139/ssrn.3119507.

[32]   S. Ali and P. Green, "Determinants of Effective Information Technology Governance : A Study of IT Intensity," *Proc. Int. IT Gov. Conf.*, 2005.

[33]   G. L. Lunardi, J. L. Becker, A. C. G. Maçada, and P. C. Dolci, "The impact of adopting IT governance on financial performance: An empirical analysis among Brazilian firms," *Int. J. Account. Inf. Syst.*, 2014, doi: 10.1016/j.accinf.2013.02.001.