

Providing a Governance Model for Information Technology (COBIT) in the Enterprise Architecture of Iran Public Libraries Foundation

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Abstract

The current study investigates using the COBIT (Control Objectives for Information and Related Technologies) framework in the enterprise architecture of the Iran Public Libraries Foundation. COBIT serves as a comprehensive framework for the management and governance of IT. COBIT helps organizations improve IT performance and realize their strategic goals, and the Enterprise Architecture (EA) is a strategic approach to align organizational components with strategic goals. Analysis, planning, design, and implementation help organizations optimize their structure and operations to achieve present and future objectives efficiently, driving digital transformation: three methodologies- eta-synthesis, Delphi, and analytical-exploratory surveys- are employed in this applied study. Using Delphi, a researcher-constructed questionnaire was given to 20 selected professionals in two stages. This resulted in the selection of 90 categories for the questionnaire construction. Accordingly, the questionnaire validity was evaluated, and the final version, including 48 items, had a content validity index above 0.79 and a content validity ratio over 0.62. Cronbach's Alpha Coefficient, which was employed to determine the reliability, proved to be 0.758. Cluster sampling was implemented in five provincial stages to guarantee sample variety from 1,836 professionals and librarians. 241 out of 638 librarians working at the main libraries were chosen randomly based on Cochran's technique. Out of them, 240 participants answered the questionnaire. The results demonstrated that the relational dimension (0.93), process dimension (0.95), and structural dimension (0.94) all had correlation coefficients for IT governance in business design. Professionals ranked business, information, technology, and applications according to their influence on organizational levels, revealing notable variations among the elements of each dimension. In summary, the success of the

structural equation model of IT governance in enterprise architecture in improving organizational performance is confirmed by its robustness and strong fit.

Keywords: Information Technology Governance, COBIT, Iran Public Libraries Foundation.

Introduction

Information and Communication Technology (ICT) has been a key component of many organizational domains for approximately thirty years, emerging as a planning focus point. Hence, IT governance guides and manages how ICT is employed in businesses. It includes creating the required management structures and rules, and strategic planning to match IT with business objectives. Better risk management and attainable objectives result from efficient governance procedures (Dadashnia Kasmani, 2019).

One of the most efficient models for putting IT governance into practice and accordingly conducting audits is the “COBIT Framework”. Furthermore, ICT innovations improve corporate design and foster the growth of competitive businesses in international marketplaces (Khayami and Raouf, 2009, quoted in Yousefi, 2018). Besides, one of the main objectives of using architecture is to control the complexity arising from the information systems and software. Hence, this complexity is rooted in multiple sources, including uncertain user needs, miscommunication between users and engineers, the complexities of the manufacturing process, software flexibility, and the absence of particular standards. The difficulties in characterizing and simulating intricate information systems highlight the necessity of considering architecture (Amarbar, 2003). Thus, the main justifications for employing enterprise design in the face of complicated IT governance account for the variety of modern technology in business, the speed at which hardware and software environments are changing, and the need for outside resources and partnerships. These elements emphasize how crucial an organized strategy is for handling the rapidly changing technology environment. Companies must implement efficient IT governance using frameworks such as COBIT to manage the complexity, guarantee alignment with corporate objectives, and improve overall performance.

Incorporation of cutting-edge ICT techniques into enterprise architecture enhances organizational competitiveness in a setting that is ever-changing and quickly changing. Organizations must make the best use of their budget and financial resources because, in the absence of a set framework, non-comparable systems will be unable to communicate effectively and contribute to corporate value loss. For enterprises, this circumstance results in many additional expenses and work (Yousefi, 2018; Ghadrnan, Davari & Shahbaz Moradi, 2012). Information Technology (IT) use in enterprises is governed and controlled by the Control Objectives for Information and Related Technologies (COBIT) framework. It involves developing the required rules, processes, management structures, and strategic IT plans to support business goals (Leinhart, Conboy & Saull, 2018). COBIT offers techniques for assessing and managing IT and for defining explicit guidelines for information architecture, strategic IT plans, and the necessary hardware and software. Thanks to this framework, organizations will make well-informed decisions on IT investments to guarantee the continuity of IT services and regulate the performance of IT systems (Modiri & Ebadi, 2011, cited in Dadashnia Kasmani, 2019). Creating an enterprise data architecture based on information systems applications is crucial. To make a principled IT-based organizational architecture, employing IT governance and a model to combine structural, procedural, and relational processes is essential. Success depends on effective communication among all departments,

which is aided by “Steering Committees” that help business and IT management roles. Consequently, 33 IT governance mechanisms were found using professionals’ comments and literature studies (De Haes & Van Grembergen, 2004; Mousakhani & Kargar, 2014).

Although COBIT, ITIL, and TOGAF all fall under the umbrella of IT governance, COBIT uniquely prioritizes the alignment of IT with overarching business objectives and the management of IT-related risks. ITIL's emphasis is predominantly on IT service management and delivering quality services, and TOGAF focuses on enterprise architecture. Considering that public libraries require a framework that holistically addresses IT alignment with organizational goals, IT risk management, and quality service delivery, COBIT presents the most compelling solution. COBIT provides a unified approach to IT governance, enabling public libraries to manage IT resources more effectively and efficiently; ITIL and TOGAF only address a component of these requirements.

While evaluating new ICTs' performance concerning organizational objectives, organizations apply the concepts of IT governance mechanisms, such as COBIT, to generate added value. The business, information, applications, and technology layers of the enterprise architecture are highlighted in this study, which attempts to demonstrate how technology affects all organizational levels. The research aims to help the Iran Public Libraries Foundation manage the challenges brought on by technological improvements by incorporating these layers inside three strategies of the IT governance framework. By concentrating on organizational levels and integrating them into structural, relational, and process methods, the current research seeks to provide a framework for the nation's public library system's enterprise architecture. This strategy will give all staff members, from upper management to front-line librarian, the knowledge they need by providing a COBIT-based model that keeps up with technology developments for the best possible service delivery.

Given the features of the nation's public libraries, including their size, complexity, specialized needs, and adaptability, an enterprise architectural model established on IT governance is required. The study will pinpoint the elements that guarantee corporate architectural coherence in the face of swift technological advancements. The company may successfully assess its enterprise architecture by consistently developing and updating plans based on COBIT components. Hence, this study emphasizes how crucial it is to incorporate IT governance frameworks such as COBIT into company design to improve organizational performance in the face of changing technological advancements. Accordingly, it seeks to handle the intricacies present in contemporary information systems while offering an organized method that promotes efficient communication and cooperation at all organizational levels.

In this regard, to achieve the main objective of the present research (to provide a model of IT governance (COBIT) in the enterprise architecture of the Iran Public Libraries Foundation), efforts will be made to address the following questions:

1. Which components and indicators of IT governance (COBIT) do professionals agree upon in the enterprise architecture of the Iran Public Libraries Foundation?
2. What is the level of significance concerning the components and indicators of IT governance (COBIT) in the organization's enterprise architecture from the perspective of professionals in the Iran Public Libraries Foundation?
3. What is the IT governance (COBIT) model in the enterprise architecture of Iran Public Libraries Foundation?

The results of the studies investigated by researchers elucidate the status of enterprise architecture and IT governance in Iranian organizations as follows:

The National Iranian Oil Company's enterprise architecture was investigated by Ghadrddan et al. (2012). Their findings revealed that the technology layer performs better than others, underscoring the importance of IT infrastructure in improving organizational performance. By utilizing the "TOPSIS" technique to identify important structural, process, and relational elements, Mousakhani and Kargar (2014) prioritized IT governance mechanisms at Saipa Company and emphasized their strategic significance. Using a balanced scorecard, Nasiri Miyaroudi (2015) assessed the IT governance performance of Tehran Regional Electric Company and concluded that efficient IT management could boost productivity through transparent procedures and ongoing oversight. Azhdari (2015) presented a combination model based on the COBIT framework and the EFQM excellence model to connect IT processes with business objectives. Khoshkhou (2016) employed a poll to evaluate the quality of the Tehran Stock Exchange IT infrastructure, showing brokers' opinions on dependability and efficacy. A fuzzy professional system for assessing IT governance norms was constructed by Vafadari Sharifabadi (2018) to support management evaluation and enhancement. Taken as a whole, these studies highlight how vital strong IT governance frameworks like COBIT are to maximizing organizational performance and adjusting to new technologies.

When Nastaran, Rajabzadeh Qatari, and Alborzi (2019) evaluated the National Archives Organization's IT maturity, they discovered that it was conscious of its requirements and made plans to improve. By investigating causal, contextual, and intervening factors, Dadashnia Kasmani (2019) offered a paradigmatic model of corporate design based on IT governance. According to Rezai Tash's (2020) investigation on social alignment at the operational level, a shared vision among employees has a positive influence on organizational performance. Using the COBIT 5 framework, Bahmanabadi and Edalatian Shahriari (2021) evaluated the IT governance maturity of Iran's National Library and Archives and found notable gaps in maturity. In their analysis of Jihad University's enterprise architecture, Samadi Parviznejad, Ghahramani-Nahr, Garachorloo, and Roshan (2022) discovered that organizational availability significantly impacted organizational maturity. Seirsadr, Tavallae, and Afshar Kazemi (2022) identified four parameters for evaluating enterprise architectural maturity in their evaluation of information management systems in research laboratories. Derogar Kalkhoran, Hariri, Babalhavaeji and Mozaffari (2024) chose 51 sources for study out of 154 to investigate the IT governance methods in corporate design between 2012 and 2023. She divided 90 codes into three categories: relational, process, and structural methods of IT governance. In light of technological improvement, the final indicators seek to establish a methodical order and integrate organizational information architecture, acting as instruments to improve the effectiveness of IT administration within the Iran Public Libraries Foundation.

Anuar and Kamruzzaman's (2017) investigation of organizational aspects, including strategy, structure, procedures, and environment, found that performance is enhanced and relationships are strengthened when these elements are in harmony. In their 2019 assessment of IT governance at the National Library of Indonesia, Setiawan and Andry discovered that although governance exists, several components are not adequately implemented, suggesting a need for improvement. A methodology for handling big data in federal enterprise architecture was established by Lnenicka and Komarkova (2019), who emphasized the need to adapt the architecture to satisfy evolving requirements. According to Amali, Katili, Suhada, and

Hadjaratie (2020), who assessed IT maturity using COBIT 5, service compliance is essential to enhancing IT performance. Through direct monitoring evaluations, Hartono, Aristo, and Rosadi (2020) qualitatively evaluated IT governance within the EDM of COBIT 5, identifying variables influencing systems.

Furthermore, Girsang and Abimanyu (2021) used TOGAF to create an enterprise architecture for the healthcare industry, emphasizing how it could solve problems and accomplish objectives. The significance of IT auditing in preserving data integrity in the digital era was highlighted by Neghabdari (2022). While Kurniawan, Achmad, and Mugitama (2023) concentrated on IT governance in a PT United Tractor TBK subsidiary and suggested a Level 3 or 4 IT system for enhanced performance, Guo, Scrine, and Liu (2024) considered information architecture for system reform. Wulyatiningsih, Grivin, and Mambu (2024) employed the COBIT 2019 framework at Bank Mandiri Girian Bitung Branch. The research emphasizes IT's role in business continuity and the importance of strong IT governance for better results and customer service. Rosady, Muhammad, and Nasiri (2025) analyzed IT innovation governance using the COBIT framework as a primary management tool. Their study highlighted significant challenges in implementing COBIT, including the necessity for a more profound understanding of the framework and clear operational standards. The research provided practical insights for practitioners while deepening our understanding of how integrated IT innovation governance aligns with broader business strategies.

According to a review of Iranian research, Iranian professionals have mainly concentrated on independently assessing IT maturity and governance or enterprise architecture. These areas of research have been the subject of separate studies by Ghadrnan et al. (2012), Azhdari (2015), Nasiri Miyanroudi (2015), Masoudi Ashtiani (2016), Khoshkhou (2016), Vafadari Sharif Abadi (2018), Bahmanabadi and Edalatian Shahriari (2021), and Seirsadr et al. (2022). A few studies have addressed these ideas independently, including Rezai Tash, Babazadeh, Zib Arzani (2020) and Mousakhani and Kargar (2014). However, as evidenced by the works of Yousefi (2018), Dadashnia Kasmani (2019), Samadi Parviznejad et al. (2022), and Nastaran et al. (2019), recent literature demonstrates an increasing focus on the convergence of IT governance maturity and enterprise design, stressing associated models and frameworks. International comparative studies illustrate a tendency to assess related factors influencing IT and organizational strategies, as evidenced by Anuar and Kamruzzaman (2017). Nonetheless, as Durachman, Chairunnisa, Soetarno, Setiawan, and Mintarsih (2017) and others revealed, numerous assessment trends have persisted in evaluating IT governance or enterprise architecture independently. Interestingly, academics from other countries have been less likely to suggest complete models compared to their Iranian colleagues. This study takes a meta-synthesis approach to find IT governance elements in the enterprise architecture of the Iran Public Libraries Foundation. By addressing internal resources and external communications, it seeks to improve decision-making for IT investment through structural, relational, and procedural tactics. Ultimately, this study offers an appropriate enterprise architectural model that enhances the efficiency of information technology investment management.

Materials and Methods

The current research is applied in terms of purpose and methodology, and it is a mixed type (qualitative and quantitative) study. It used a qualitative approach with a Delphi approach in

determining the strategy and a quantitative approach in the explanation stage of the questionnaire, seeking to present a new model for the Enterprise Architecture of the Iran Public Libraries Foundation. The results of this research can be used for all public libraries in Iran. The first stage includes searching in print and digital libraries, searching and examining the internet and online international databases (Google Scholar, Emerald, Science Direct, Scopus, and Web of Science), as well as the publications and internal websites of IranDoc and Magiran, to collect information about the identification of the evaluation components of digital libraries. For this purpose, about 154 documents related to the keywords were searched by reviewing the mentioned items. Among the searched documents, 51 relevant documents were analyzed for their content, and the questionnaire design was extracted and carried out based on the components mentioned in the analyzed texts and sources. The main tools for data collection were a checklist and a check sheet to determine the main components and indicators.

The questionnaire questions were designed based on numerous corrections and controls on the components and sub-components. The data collection tool in the quantitative phase was a researcher-made questionnaire consisting of 12 elements and 166 questions, designed based on the initial conceptual model. This questionnaire's answers were created based on a five-point Likert scale using a range of appropriateness. These components include Structural (1. Business organizational layers, 2. Layers of information organization, 3. Layers of application programs, 4. Layers of technology organization), Process (1. Business organizational layers, 2. Layers of information organization, 3. Layers of application programs, 4. Layers of technology organization), Relational (1. Business organizational layers, 2. Layers of information organization, 3. Layers of application programs, 4. Layers of technology organization)

The researcher's questionnaire was confirmed using the Delphi technique and the consensus of professional experts (20 experts in Knowledge and information science). Using this technique, each expert was asked in two stages to rate each indicator using a Likert scale.

In the first stage, 20 people approved the amendments and working process of the questionnaire, and 20 people approved them in the second stage.

The content validity was tested quantitatively using two relative coefficients of content validity (CVR) and content validity index (CVI). It was calculated by summing up the agreeable points for each item that obtained a relevant point but needed to be reviewed. It was utterly appropriate to divide the total number of experts to determine CVR; experts were asked to assess each item based on the three-part spectrum of "necessary," "useful but not necessary," and "not necessary." Then, the answers were calculated according to the formula, and the wording and order of questions were modified based on the experts' suggestions, which were used to examine the tool's validity by approving the items with a calculated CVR of more than 48. The reliability of the questionnaire was assessed using the Cronbach's alpha method. After collecting the questionnaires and performing the necessary calculations to implement the process as mentioned earlier, the reliability of all the variables was found to be more than 0.7, confirming the reliability of the questionnaire. After going through these steps, a questionnaire was made online by sending the link to 241 questionnaires to the statistical community. After several follow-up steps, all the information from 240 returned questionnaires was entered into the SPSS software. In the second stage of the research, the structural equation modeling method and AMOS software were used to fit the model. Consequently, the research findings were divided into descriptive and inferential. Frequency distributions, dispersion, and central tendency were included in the descriptive results. Inferential findings clarified the IT

governance model in enterprise architecture based on structural equation modeling using exploratory factor analysis, one-sample t-tests, Kendall's coefficient, and Friedman tests.

Result

This study emphasizes how crucial it is to incorporate IT governance considerations into enterprise design to improve IT investment decision-making. The research seeks to increase the enterprise architecture's efficacy inside the Iran Public Libraries Foundation through a comprehensive approach that incorporates relational, structural, and procedural tactics. The results highlight how business design influences internal and external communication, resulting in better-informed and strategic choices for efficiently managing IT resources. This novel method is anticipated to make a substantial theoretical and practical contribution to enterprise design and IT governance. The Delphi technique validated the IT governance indicators in corporate design in the qualitative section. Based on the findings of the Delphi process, a researcher-made Delphi questionnaire was given to participants in the quantitative phase. They were asked to reply to questions based on the wanted and current criteria. The final model was then presented after the replies were investigated. Research Question 1: Which components and indicators of IT governance (COBIT) do professionals agree upon in the enterprise architecture of Iran Public Libraries Foundation?

The first round of the Delphi questionnaire included 166 mechanisms designed to yield information on the IT governance mechanisms in the enterprise architecture of the Iran Public Libraries Foundation. Except for 48 cases, the average of the 166 suggested methods, as determined by the data collected from respondents, is more than 3. The second round of Delphi was used since the degree of consensus, as indicated by the Kendall test findings, is 0.610, below the minimal requirement of 0.700 for unanimity.

Finally, 90 categories were extracted for the questionnaire's formulation based on the professionals' degree of agreement. With a content validity index of more than 0.79 and a content validity coefficient greater than 0.62, the questionnaire's validity was evaluated for each item using qualitative content validity techniques. This finally led to developing a 48-item survey for librarians and professionals to analyze the second research question employing the Friedman test. Research Question Two: How important are the components and indicators of IT governance (COBIT) in the organization's enterprise architecture from the perspective of professionals at the Public Libraries Foundation?

The characteristics of the statistical population of professionals, from which 241 librarians were selected, and finally, in response to the prioritization of the most essential components, the results can be stated as follows (Table 1).

Table 1

Investigation of the most critical components of IT governance in the enterprise architecture of the Public Library Foundation

| Dimensions | Components | Mean Rank | Chi-Square | Degrees of Freedom | Significance |
|------------|---------------------------------------|-----------|------------|--------------------|--------------|
| Structural | 1. Business organizational layers | 4 | 295.680 | 3 | 0.000 |
| | 2. Layers of information organization | 99.2 | | | |
| | 3. Layers of application programs | 51.1 | | | |
| | 4. Layers of technology organization | 50.1 | | | |
| Process | 1. Business organizational layers | 4 | 295.674 | 3 | 0.000 |
| | 2. Layers of information organization | 52.2 | | | |
| | 3. Layers of application programs | 47.2 | | | |
| | 4. Layers of technology organization | 1 | | | |
| Relational | 1. Business organizational layers | 96.3 | 957.699 | 3 | 0.000 |
| | 2. Layers of information organization | 98.2 | | | |
| | 3. Layers of application programs | 2.06 | | | |
| | 4. Layers of technology organization | 1 | | | |

The findings in Table 1 demonstrate substantial variations among different components within each dimension, with the significance threshold for all dimensions being less than 0.01. Professionals evaluated the influence of structural dimension components on organizational layers as follows: applications (1.50), technology (1.51), information (2.99), and business (4). Applications (1), business (2.52), technology (2.47), and information (mean rank 4) are the most significant components for the process dimension. Applications have the most impact on architecture in the relational dimension (mean rank 3.96), followed by technology (2.98), information (2.06), and business (1). To answer the third question on the IT governance model (COBIT) in the Public Libraries Foundation's enterprise architecture, exploratory factor analysis will be carried out after these components are prioritized. The questionnaire will be subjected to exploratory factor analysis to find pertinent components and dimensions, and each item will be explained appropriately. To prioritize and classify all components according to professionals' viewpoints, the data analysis will evaluate the state of each dimension and use a one-sample t-test to analyze the impact of IT governance on corporate design.

This study's Kaiser-Meyer-Olkin (KMO) statistic is around 0.976, as seen in Table 2. This figure shows that the factor analysis is appropriate regarding sample adequacy because it is higher than 0.6. Furthermore, Bartlett's test statistics displayed a value of 11979.27 with 1035 degrees of freedom, which is significant at the 0.01 level ($p < 0.01$). This implies that the test's null hypothesis, which states no connection between the variables, is rejected. As a result, factor analysis is acceptable, and there is a correlation between the questionnaire's items. To make it convenient to comprehend the structure and increase its relevance, dependability, and

reproducibility, factors are structurally transformed into a simpler structure of factor loadings. This process is known as "rotation of factors." As a result, rotating factors alter their loadings and meanings appropriately, and the rotated factors sufficiently explain the original solution and common variance. Consequently, 46 of the questionnaire's 48 items are assigned to a unidimensional rotated component due to factor loadings greater than 0.3.

Table 2

Analysis of Bartlett's Test and KMO

| KMO | Chi-square | Degrees of Freedom | Significance of Bartlett's Test |
|-------|------------|--------------------|---------------------------------|
| 0.976 | 11979.268 | 1035 | 0.000 |

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Following exploratory factor analysis, the findings from considering each of the twelve factors are presented in Table 3. All of the issues under investigation fit into one of three categories: relational, process, or structural mechanisms of IT governance. The factor loadings of the chosen questions are at least 0.3.

Table 3

Investigation of each of the twelve factors after exploratory factor analysis

| Dimensions | Factors | Naming | Questions | Number of Items |
|---|---------|---------------------------------------|-------------------------------|-----------------|
| 1. Structural mechanisms of IT governance | First | 1. Business organizational layers | 1-2-3-4-5-6-7-8 | 8 |
| | Second | 2. Layers of information organization | 9-10-11-12 | 4 |
| | Third | 3. Layers of application programs | 13-14 | 2 |
| | Fourth | 4. Layers of technology organization | 15-16 | 2 |
| 2. Process mechanisms of IT governance | Fifth | 1. Business organizational layers | 17-18-19 | 3 |
| | Sixth | 2. Layers of information organization | 20-21-22-23-24-25-26-27-28-29 | 10 |
| | Seventh | 3. Layers of application programs | 30 | 1 |
| | Eighth | 4. Layers of technology organization | 31-32-33 | 3 |
| 3. Relational | Ninth | 1. Business organizational layers | 34 | 1 |

| Dimensions | Factors | Naming | Questions | Number of Items |
|-----------------------------|----------|---------------------------------------|----------------|-----------------|
| mechanisms of IT governance | Tenth | 2. Layers of information organization | 35-36-37 | 3 |
| | Eleventh | 3. Layers of application programs | 38-39-40-41-42 | 5 |
| | Twelfth | 4. Layers of technology organization | 43-44-45-46 | 4 |

This section will use measures of central tendency (mean) and measures of dispersion (standard deviation) to evaluate and characterize each dimension and component of the study after analyzing the factor loadings and deciding on the number of questions for each component (Table 4).

Table 4

Description and investigation of the main variables of the research

| Dimensions | Components | Minimum | Maximum | Mean | Standard Deviation |
|---|---|---------|---------|-------|--------------------|
| 1. Structural mechanisms of IT governance | Business organizational layers | 8 | 40 | 26.34 | 6.30 |
| | Layers of information organization | 4 | 20 | 13.09 | 3.46 |
| | Layers of application programs | 2 | 10 | 6.71 | 1.78 |
| | Layers of technology organization | 2 | 10 | 6.65 | 1.73 |
| | Total Score of Structural Mechanisms of IT Governance | 16 | 80 | 52.80 | 12.49 |
| 2. Process mechanisms of IT governance | Business organizational layers | 3 | 15 | 9.63 | 2.72 |
| | Layers of information organization | 10 | 50 | 32.23 | 8.46 |
| | Layers of application programs | 1 | 5 | 3.23 | 0.99 |
| | Layers of technology organization | 3 | 15 | 9.55 | 2.69 |
| | Total Score of Process mechanisms of IT governance | 17 | 85 | 54.65 | 14.11 |
| 3. Relational mechanisms of IT governance | Business organizational layers | 1 | 5 | 3.28 | 0.98 |
| | Layers of information organization | 3 | 15 | 9.66 | 2.73 |
| | Layers of application programs | 5 | 25 | 16.17 | 4.36 |
| | Layers of technology organization | 4 | 20 | 12.60 | 3.54 |
| | Total Score of Relational mechanisms of IT governance | 13 | 65 | 41.72 | 10.96 |

With a standard deviation of 12.49 and a total score of 52.80 for the structural mechanisms of IT governance (Table 4), the results imply that the average is high. The total score of IT governance process mechanisms is 54.65 with a standard deviation of 14.11, and the average total score of its relational mechanisms is 41.72 with a standard deviation of 10.96. These results demonstrate that, although the relational mechanisms are average, the process mechanisms'

average is higher than the mean. Finally, in response to the third question, the model of IT governance in enterprise architecture was clarified through the use of structural equation modeling as shown in the section on structural equation modeling using maximum likelihood estimation for the IT governance model in the enterprise architecture of the Public Libraries Foundation with AMOS software (Figures 1 and 2).

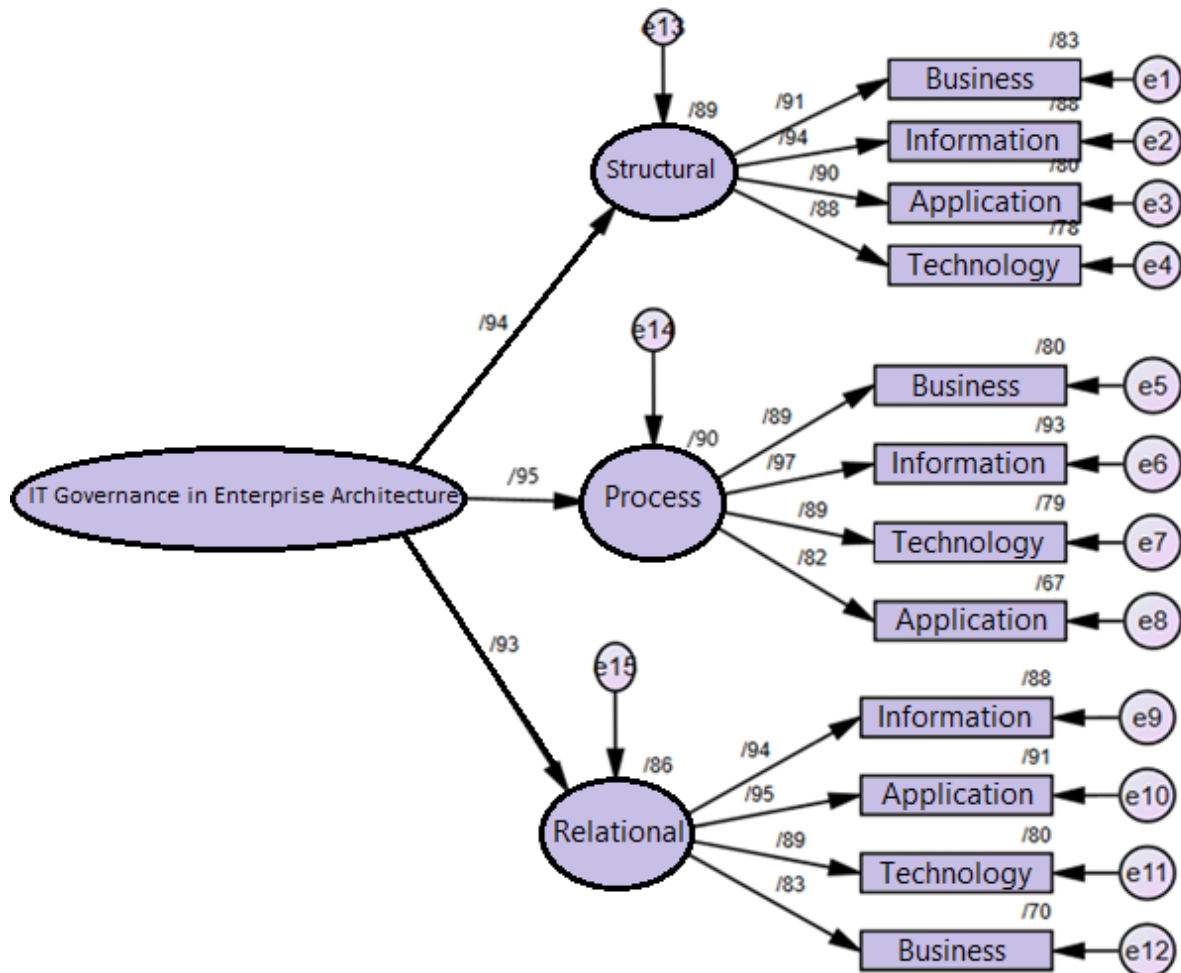


Figure 1: Structural equation model of IT governance in the enterprise architecture of Public Libraries Foundation

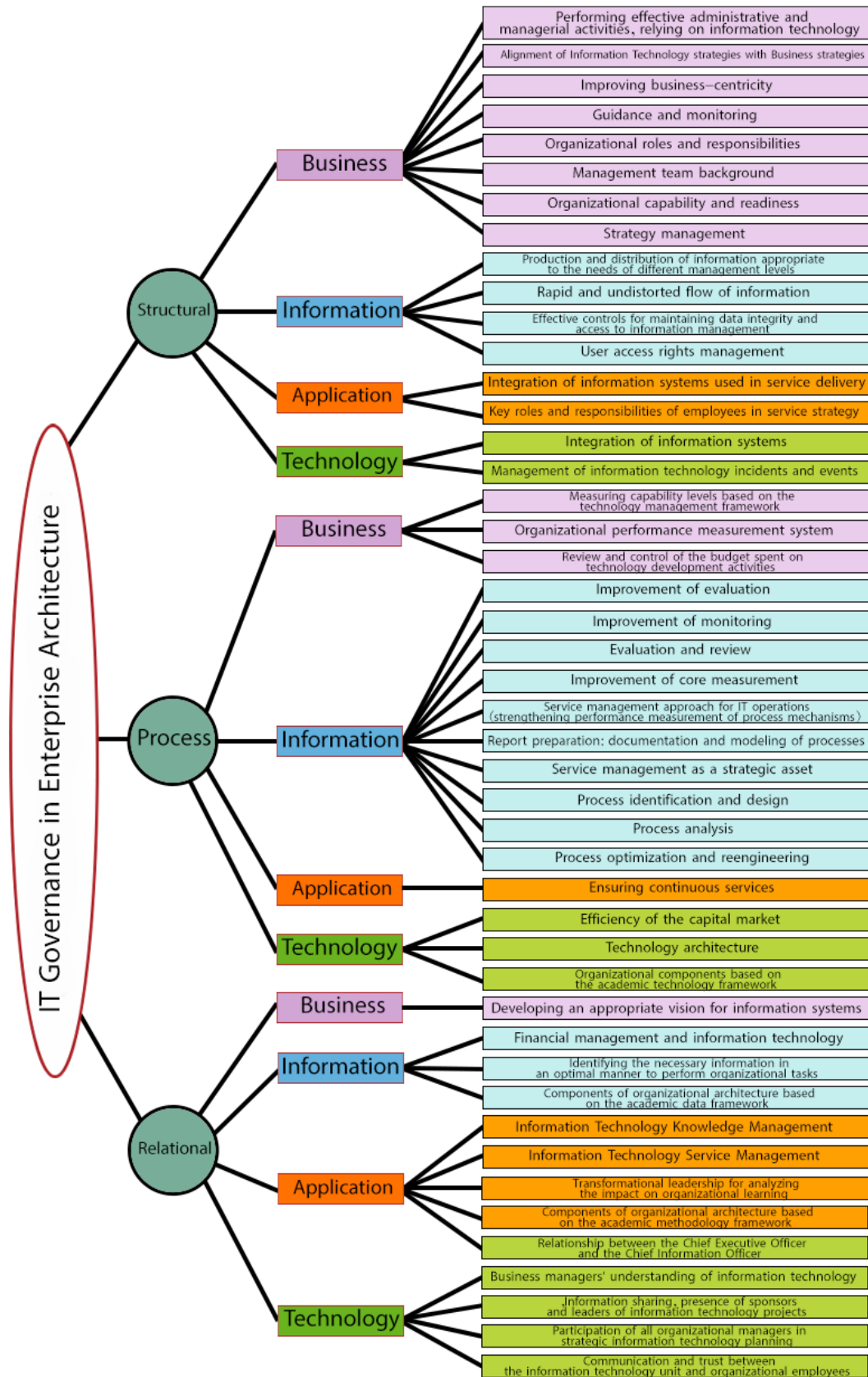


Figure 2: Structural equation model of IT governance in the enterprise architecture of Public Libraries Foundation

Discussion

Key Findings

Structural, process, and relational mechanisms

This section will employ measures of central tendency (mean) and measures of dispersion (standard deviation) to evaluate and characterize each dimension and component of the research after deciding on the number of questions. The answers to the following questions will ultimately highlight the structural, procedural, and relational mechanisms of IT governance based on the COBIT model, allowing for a workable model to be presented for developing a suitable enterprise architecture concerning the Public Libraries Foundation. This is achieved by analyzing the components and turning them into new factors using exploratory and confirmatory factor analysis. In response to the first question, "Which components and indicators of IT governance (COBIT) do professionals agree upon in the enterprise architecture of the Public Libraries Foundation?" it can be stated that:

- The total score of structural mechanisms of IT governance is 52.80 with a standard deviation of 12.49, indicating that the average obtained is above the mean.
- The average total score of process mechanisms of IT governance is 54.65 with a standard deviation of 14.11; finally,
- The total score of relational mechanisms of IT governance is 41.72 with a standard deviation of 10.96.

Considering the findings, relational mechanisms are at an average level, while the average of process mechanisms is higher than the mean. An initial analysis of the frequency and percentage distribution of answers to questions was conducted to address the second research question, which concerned the significance of IT governance components (COBIT) in the Public Libraries Foundation's enterprise architecture. Prioritizing the most crucial elements was established using the Friedman statistical test, which showed that all dimensions had a significant level below 0.01. This indicates substantial variations across different elements for every dimension. Professionals gave business-related organizational levels the highest mean ranking of 4 in the structural dimension of IT governance, followed by information (2.99), technology (1.51), and applications (1.50). The most crucial element for the process dimension was information (mean rank 4), which was followed by business (2.52), technology (2.47), and applications (1). Applications were considered most important in the relationship dimension (3.96), followed by business (1), technology (2.98), and information (2.06).

AMOS software was utilized to perform structural equation modeling to address the third question concerning the Public Libraries Foundation's enterprise architecture's use of the IT governance model (COBIT). A maximum likelihood estimate was employed to depict the IT governance model, producing a schematic model presentation. According to the exploratory factor analysis, the first component had an eigenvalue of 2.382; nonetheless, the eigenvalues of the remaining factors were lower. Twelve variables in all explained 64.80% of the variation after rotation. The rotation changed factor loadings and meanings; out of 46 items, several had factor loadings greater than 0.3 and were placed in a unidimensional rotated component. The eigenvalue of the first factor is 2.382, according to the findings of the exploratory factor analysis in the rotated state. The eigenvalues of the remaining factors are lower. After rotation, the twelve components' total explained variance is 64.80%. The components' loadings and, hence, their meanings, are altered by rotating them. The following table lists the rotated factors. Some

46 items on the scale were assigned to a unidimensional rotated component due to factor loadings greater than 0.3. The following are the outcomes:

- Factor One: Business Organizational Layer - Structural Mechanism;
- Factor Two: Information Organizational Layer - Structural Mechanism;
- Factor Three: Applications Organizational Layer - Structural Mechanism;
- Factor Four: Technology Organizational Layer - Structural Mechanism;
- Factor Five: Business Organizational Layer - Process Mechanism;
- Factor Six: Information Organizational Layer - Process Mechanism;
- Factor Seven: Applications Organizational Layer - Process Mechanism;
- Factor Eight: Technology Organizational Layer - Relational Mechanism;
- Factor Nine: Business Organizational Layer - Relational Mechanism;
- Factor Ten: Information Organizational Layer - Relational Mechanism;
- Factor Eleven: Applications Organizational Layer - Relational Mechanism;
- Factor Twelve: Technology Organizational Layer - Relational Mechanism;

In conclusion, it is necessary to investigate the model fit indices to summarize the results and validate the structural equation modeling. According to the model fit indices, the suggested model fits the data relatively well. The comparative fit index and the Storrs-Bentler Scaled Chi-Square normed fit index are among these indices. The relative chi-square is utilized for decision-making since the chi-square statistic is highly dependent on sample size, meaning that increasing the sample size will raise the statistic. Relative chi-square values indicate an adequate fit between 1 and 5, while values indicate a good match between 2 and 3. A good and acceptable fit is indicated if the RMSEA index is less than 0.08 and the CFI and NFI indices are more than or equal to 0.90. Table 5 displays the model fit indices for the suggested model of this study.

Table 5

Fit indices of the structural equation model of IT governance in the enterprise architecture of public libraries foundation

| CMIN/DF | NFI | CFI | PNFI | RMSEA |
|---------|-------|-------|-------|-------|
| 2.423 | 0.968 | 0.981 | 0.948 | 0.0 |

Consequently, the findings of the evaluation of the fit indices for the structural equation model of IT governance in the Public Libraries Foundation's business architecture are presented in Table 5. The very good and acceptable outcome confirms the model, as indicated by the chi-square statistics to degrees of freedom ratio of 2.423. The following are the values for the three indices: With NFI, CFI, and PNFI of 0.968, 0.981, and 0.948, respectively, all three indices appear to be above 0.90 and in a good state. Lastly, the RMSEA index is less than 0.08 at 0.077. Overall, the model's fit indices (Figure 1) are validated. These results suggest a strong and positive correlation between the dimensions of IT governance in enterprise architecture: 0.94 for the structural dimension, 0.95 for the process dimension, and 0.93 for the relational dimension. The structural equation model of IT governance in enterprise architecture, together with its dimensions and components, is a strong model with a good fit, and this model is confirmed. Each dimension also has a factor loading over 0.80 with its corresponding

components.

Comparison with existing literature: Contrasts and commonalities

Considering the analyses derived from previous studies and comparing them with the current research, it can be concluded that:

Ghadrdan et al. (2012) discovered that the technology layer was more important than the business, information, applications, and technology layers in their study of the National Iranian Oil Company's enterprise architecture. The Public Libraries Foundation's technology layer is evaluated in the middle by professionals and librarians based on Friedman tests, which deviates from Ghadrdan et al's conclusions, even though this study aligns with current research in analyzing enterprise architectural layers. Mousakhani and Kargar (2014) identified critical structural mechanisms and used the TOPSIS technique to rank IT governance mechanisms. Professionals in this study determined that business organizational layers were the most crucial elements, with information technology and applications coming in second and third place, respectively. Despite their shared emphasis on structural processes, the two research approaches differ.

Regardless of its low overall value, leadership, professionalism, and management influence relational mechanisms. Applications proved the highest average score of 3.96 in this study's relational dimension of IT governance, followed by technology (2.98), information (2.06), and business (1). This, in turn, suggests a misalignment with earlier research. Performance evaluation and the primary IT governance procedures are essential components of process mechanisms. Information organizational layers, on the other hand, rate highest (4) in the process dimension of this study, followed by business (2.52), technology (2.47), and applications (1). The results contradict each other since the primary processes in the previous study were classified as applications, which are considered the least significant in this context. However, enterprise architectural elements and aspects of relational, processual, and structural IT governance are continuously covered in both studies.

Employing the COBIT framework, Ezhdari (2015) proposed a methodology for evaluating how information technology affects organizational performance in two domains: information technology and organizational performance. This approach, which aligns with the technology layer component from the process mechanism standpoint of current research, utilizes IT objectives to link organizational objectives with IT processes. According to Nasiri Meyanroudi's (2015) balanced scorecard analysis of Tehran Regional Electricity Company's IT governance performance, effective IT management increases efficiency and plays a pivotal role. Despite taking different approaches, both studies agree on the strategic subcomponents of the IT governance application planning layer.

Moreover, Masoudi Ashtiani's (2016) assessment of IT maturity in power plants using the COBIT maturity model is incongruous with current studies. While Nastaran et al. (2019) presented an IT maturity model for Iranian government enterprises, Khoshkhou (2016) used COBIT to evaluate the quality of IT infrastructure at the Tehran Stock Exchange. These two studies only implemented the same survey technique. To select a suitable framework, Vafadari Sharif Abadi (2018) evaluated the state of IT governance, which was consistent with the current study's analysis of IT governance elements. In line with the present research emphasis on process mechanisms, Yousefi (2018) proposed a model to improve corporate architecture

through increasing IT utilization.

In line with the current research, Dadashnia Kasmani (2019) took a mixed-method approach to provide a paradigmatic model of enterprise design based on IT governance. Only the overall processing components of IT governance structures and organizational performance are aligned, according to Rezai Tash et al.'s (2020) investigation. Using COBIT 5, Bahmanabadi and Edalatian Shahriyari (2021) evaluated the maturity of IT governance in five areas. They identified deficiencies that did not correspond with the National Library and Archives Organization of Iran's plans. Samadi Parviznejad et al. (2022) addressed enterprise architecture-based engineering technology infrastructure and discovered that this greatly impacted organizational maturity. Seirsadr et al. (2022) determined four aspects of architectural maturity in their evaluation of information management systems in research labs. Their results are consistent with the enterprise architecture layer study that is currently underway.

Moreover, Dorchaman et al. (2017) evaluated information security governance at Sirif Hedayatullah University using COBIT 5 in worldwide studies; however, their focus did not match the objectives of this study. In exploring organizational determinants influencing performance, Anuar and Kamruzzaman (2017) emphasized the significance of structural and process aspects pertinent to their investigation. The sole methodological similarity is between Setiawan and Andry's (2019) qualitative evaluation of IT governance at Indonesia's National Library. Overall, multiple studies differ significantly in their emphasis or methods of execution, even though some have topics or procedures in common with the present study.

A comparison of the current study with Seire Sadr, Tavalei, and Afshar Kazemi (2022) reveals that four levels of business architecture and the three dimensions- structural, process, and relational- are in sync. Durachman et al. (2017) evaluated information security governance at Sirif Hedayatullah University Library using COBIT 5 in worldwide studies, achieving system enhancement through high-standard security policies; nevertheless, this is inconsistent with the current research. Also, according to Anuar and Kamruzzaman (2017), there are commonalities in the structural and procedural aspects of enterprise architecture that influence performance. At Indonesia's National Library, Setiawan and Andry (2019) investigated IT governance using COBIT 5, using the same methods but with different results. While addressing issues with government enterprise architecture, Lnenicka and Komarkova (2019) disagree with the present research emphasis on COBIT. Partially in line with this study, Amali et al. (2020) assessed IT maturity levels using COBIT 5. IT governance was qualitatively evaluated by Hartono et al. (2020) without going beyond methodology. The business architecture for healthcare created by Girsang and Abimanyu (2021) failed to fit the elements of the current research. In his study of IT governance from a COBIT 5 viewpoint, Neghabdari (2022) strongly emphasized auditing and found that component inspections lacked uniformity. In addition, redesigning an information architecture without alignment was studied by Guo et al. (2024). Kurniawan et al. (2023) used COBIT 5 to study IT governance and suggested that, although having similar terms, they exhibited apparent discrepancies.

Conclusion

In conclusion, highlighting the viewpoints of librarians and professionals as well as addressing the advantages and disadvantages found in the current study, it is demonstrated that: the average total score of the relational mechanisms of IT governance is 41.72, which is at a moderate level compared to the other two mechanisms, and the average total score of the structural mechanisms of IT governance is 52.8, which is above the average obtained.

Additionally, the average total score of the process mechanisms of IT governance is 54.65, which is also above the average. These findings suggest that strategies should be proposed among professionals and librarians to strengthen the components of the four layers of enterprise architecture.

1. The business organizational layer approach promotes establishing an acceptable information system vision, encourages professionals to engage in programs and strategic alliances, and employs convenient methods like training workshops.

2. The information organizational layer approach encourages librarians and professionals to identify the information required to undertake organizational tasks efficiently, helps the Foundation's employees, and trains them to create the best databases and establish communication channels with other departments. It also assists librarians in performing organizational tasks to enhance the performance of enterprise architecture based on IT governance in the information organizational layer. Lastly, it provides training in information technology-related knowledge management.

3. Also, it reinforces the organizational levels of the applications' subcomponents including effective design of mechanized human resource systems, training in IT service management, enhancing educational and research processes in public libraries, training staff to identify effective factors of enterprise architecture, and their interactions with each other, training in knowledge management and key roles of staff involved in service delivery, organizing enterprise architecture components based on an academic framework methodology, training in communications management, support management, service delivery, and equipment management as well as strengthening organizational communication systems, establishing and enhancing proper relationships between the organization's senior manager and the senior IT manager for allocating and securing resources for information technology, creating a quality-oriented culture and customer-centricity in executing IT projects among staff, etc.

4. The final step is to incorporate information technology into the organization's vision. Other subcomponents of the technology organizational layers include developing a comprehensive IT plan, establishing a common understanding among business managers regarding information technology, ensuring information sharing, having sponsors, assigning managers for IT projects, involving all managers in strategic IT planning, and establishing communication and trust among the IT department and organizational staff.

5. According to professionals, technology has an average rank of 1.51, applications 1.50, information organizational layer 2.99, and business organizational layer four as the most significant components of structural IT governance. Information organizational layers are the most important elements in the process dimension, with an average rank of 4. Business comes in second place with an average rank of 2.52, technology with an average rank of 2.47, and applications with an average rank of 1.

6. This study offers a valuable framework for policymakers to design and implement effective IT governance policies in public libraries. It reveals that prioritizing procedural and structural mechanisms can significantly improve efficiency and service quality. Librarians can utilize this research to understand better their critical role in IT management, gaining access to relevant tools and strategies for enhancing organizational performance and underscoring the need for focused IT training. Furthermore, IT professionals will find that the study emphasizes the importance of cross-departmental collaboration to align IT and organizational goals and

build strong communication channels between IT management and senior executives.

Suggestions

Consequently, it is recommended that to develop an enterprise architecture with a focus on organizational components, the following subcomponents of each mechanism's weaker layers should be strengthened:

a. To improve IT governance, focus on strengthening the applications layer. This involves integrating information systems, enhancing alignment, and supporting enterprise architecture planning. Key steps include establishing a shared vision, clarifying organizational performance, and assigning roles across all levels of management.

b. Strengthening IT governance involves enhancing the applications layer's subcomponents. This includes improving staff performance in information creation, documenting processes, and upgrading enterprise architecture through automation. Continuous service improvement, process analysis, system security, optimal information system design, and cost allocation are also essential.

c. The business organizational architecture layer needs improvement to strengthen IT governance in public libraries. This involves establishing a clear information system vision and engaging staff through strategic partnerships and programs. Additionally, IT managers should foster a better understanding of business operations.

References

- Amali, L. N., Katili, M. R., Suhada, S. & Hadjaratie, L. (2020). The measurement of maturity level of information technology service based on COBIT 5 framework. *Telkomnika (Telecommunication Computing Electronics and Control)*, 18(1), 133-139. <http://doi.org/10.12928/telkomnika.v18i1.10582>
- Amarbar, R. (2003). *Presentation of a model for reference architecture solutions*. Master's thesis, Islamic Azad University, Science and Research Branch. [in Persian]
- Anuar, H. S. & Md Kamruzzaman, M. K. (2017). Improving organizational performance through strategic fit of it-business strategic alignment. *International Journal of Economics, Commerce and Management*, 7(12), 1047-1054. Retrieved from <https://ijecm.co.uk/wp-content/uploads/2017/12/51259.pdf>
- Azhdari, P. (2015). *Presentation of a model for evaluating the impact of information technology on organizational performance*. Master's thesis in Information Technology Engineering (Management of Information Systems), Faculty of Electronic Education, Shiraz University. [in Persian]
- Bahmanabadi, M. & Edalatiyan Shahriyari, J. (2021). Evaluating the maturity of information technology governance in National Library and Archives of Iran, based on the COBIT 5 Framework. *Journal of Information Management Processing*, 37(4), 1067-1096. <https://doi.org/10.35050/JIPM010.2022.003> [in Persian]
- Dadashnia Kasmani, R. (2019). *Presentation of a paradigmatic model for enterprise architecture based on IT governance with a mixed research approach in Etk organization*. Doctoral thesis in Information Technology Management (Smart Business concentration), Faculty of Management, Information Technology Management Group, Islamic Azad University, Central Tehran Branch. [in Persian]

- De Haes, S. & Van Grembergen, W. (2004). IT Governance and its mechanisms. *Information Systems Control Journal*, 1, 1-7. Retrieved from [https://static.aminer.org/pdf/PDF/000/245/098/introduction to the minitrack it governance and its mechanisms.pdf](https://static.aminer.org/pdf/PDF/000/245/098/introduction%20to%20the%20minitrack%20it%20governance%20and%20its%20mechanisms.pdf)
- Derogar Kalkhoran, S., Hariri, N., Babalhavaeji, F. & Mozaffari A. (2024). Determining the factors of IT governance in the enterprise architecture of the Iran Public Libraries Foundation. *Research on Information Science and Public Libraries*, 30(in Press). Retrieved from <https://publii.ir/article-1-2567-en.pdf>
- Durachman, Y., Chairunnisa, Y., Soetarno, D., Setiawan, A. & Mintarsih, F. (2017, August). IT security governance evaluation with use of COBIT 5 framework: A case study on UIN Syarif Hidayatullah library information system. In *2017 5th International Conference on Cyber and IT Service Management (CITSM)* (pp. 1-5). IEEE. <https://doi.org/10.1109/CITSM.2017.8089302>
- Ghadrdan, A., Davari, A. & Shahbaz Moradi, S. (2012). Evaluation of the enterprise architecture of the National Iranian Oil Company from the perspective of human resources experts. *Monthly Exploration and Production Journal*, 92, 19-22. [in Persian]
- Girsang, A. S. & Abimanyu, A. (2021). Development of an Enterprise Architecture for Healthcare using TOGAF ADM. *Emerging Science Journal*, 5(3), 305-321. <https://doi.org/10.28991/esj-2021-01278>
- Guo, H., Scriney, M. & Liu, K. (2024). An ostensive information architecture to enhance semantic interoperability for healthcare information systems. *Information Systems Frontiers*, 26(1), 277-300. <https://doi.org/10.1007/s10796-023-10379-5>
- Haghighat Monfared, J., Dadashnia Kasmani, R. & Tabatabaee, Gh. H. (2019). A paradigmatic model of information technology architecture based on COBIT 2019 Framework. *Business Intelligence Management Studies*, 8(30), 189-222. <https://doi.org/10.22054/ims.2019.10623> [in Persian]
- Hartono, H., Aristo, J. & Rosadi, P. (2020). Evaluating IT governance at network access provider on COBIT 5 domain EDM. *Journal of Systems Integration*, 11(2), 1-10. <https://doi.org/10.20470/jsi.v11i2.397>
- Khoshkhou, M. (2016). *Evaluation of the quality of IT infrastructure library in the Tehran Stock Exchange (based on the COBIT model)*. Master's thesis in Management (Production concentration), Faculty of Management, Industrial Management Group, Islamic Azad University, Central Tehran Branch. [in Persian]
- Kurniawan, K., Achmad, K. A. & Mugitama, S. A. (2023). Information technology governance analysis using COBIT 5 Framework:(Case Study: PLANT division PT Pamapersada Nusantara). *Indonesian Journal on Computing (Indo-JC)*, 8(1), 1-14. <https://doi.org/10.34818/INDOJC.2023.8.1.686>
- Lainhart, J., Conboy, M. & Saull, R. (2018). *COBIT 2019 Framework: Introduction and methodology*, First Edition, USA, ISACA.
- Lnenicka, M. & Komarkova, M. (2019). Developing a government enterprise architecture framework to support the requirements of big and open linked data with the use of cloud computing. *International Journal of Information Management*, 46,124-141. <https://doi.org/10.1016/j.ijinfomgt.2018.12.003>

- Masoudi Ashtiani, H. (2016). *Evaluation of IT maturity and presentation of a program to achieve target maturity in selected power plants under Tavanir Company*. Master's thesis in Industrial Engineering at the Faculty of Industrial Engineering at Ivanaki University. [in Persian]
- Modiri, N. & Ebadi, Z. (2011). The role of IT components in evaluating organizational IT performance. *First Regional Conference on New Approaches in Computer Engineering and Information Technology, Rudsar*.
- Mousakhani, M. & Kargar, M. H. (2014). Prioritizing IT governance mechanisms based on focus areas at Saipa Company. *Researcher Quarterly Journal of Management*, 11(34), 83-99. [in Persian]
- Nasiri Miyanroudi, R. (2015). *Evaluation of IT governance and efficiency of IT management using COBIT models and balanced scorecard and identifying the relationship between them at Tehran Regional Electricity Company*. Master's thesis in Information Technology Management at Payame Noor University, Computer Engineering and Information Technology Group in North Tehran Center. [in Persian]
- Nastaran, A., Rajabzadeh Qatari, A. & Alborzi, M. (2019). Presenting the IT maturity model in Iranian governmental organizations. *Quarterly Journal of Human Resource Management Researches*, 8(3), 127-140. Retrieved from <https://ormr.modares.ac.ir/article-28-26414-en.pdf>
- Neghahdari, M. (2022). COBIT 5: Governance and the security of IT. *Fifth Annual International Conference on New Developments in Management, Economics and Accounting*. Tehran, Iran. [in Persian]
- Rezaei Tash, E. (2020). Examining the impact of IT governance mechanisms on aligning IT and organizational performance (case study: Governorate of Tabriz County). Master's thesis at Alzahra University Social and Economic Sciences Faculty, Urmia Branch, Information Technology Management concentration with e-business focus. [in Persian]
- Rezaei Tash, E., Babazadeh, R. & Zib Arzani, M. (2020). IT governance on social alignment of business and IT and organizational performance. *Fifth National Conference on Economics, Management and Accounting*. [in Persian]
- Rosady, M. M., Muhammad, A. H. & Nasiri, A. (2025). Analysis of information technology innovation governance using cobit: systematic literature review. *JlPI (Jurnal Ilmiah Penelitian dan Pembelajaran Informatika)*, 10(1), 533-541. <https://doi.org/10.29100/jlpi.v10i1.5758>
- Samadi Parviznejad, P., Ghahramani-Nahr, J., Garachorloo, N. & Roshan, V. (2022). Technology Infrastructure Engineering Based on Enterprise Architecture (Case Study; East Azerbaijan ACECR). *Quarterly Journal of Industrial Technology Development*, 20(47), 3-16. Retrieved from https://jtd.iranjournals.ir/article_251969_14b0556d76c6b2e010f8a17ad4acf164.pdf?lang=en [in Persian]
- Seirsadr, A., Tavallae, R., Afshar Kazemi, M. A. (2022). Evaluation of organizational implementation on research laboratory information management systems using organizational maturity. *Journal of Payavard Salamat*, 16(1), 1-9. Retrieved from <https://payavard.tums.ac.ir/article-1-7183-fa.pdf> [in Persian]

- Setiawan, A. K. & Andry, J. F. (2019). It governance evaluation using cobit 5 framework on the national library. *Jurnal Sistem Informasi (Journal of Information System)*, 15(1), 1-17. Retrieved from <https://download.garuda.kemdikbud.go.id/article.php?article=3589367&val=31161&title=IT%20GOVERNANCE%20EVALUATION%20USING%20COBIT%205%20FRAMEWORK%20ON%20THE%20NATIONAL%20LIBRARY>
- Vafadari Sharif Abadi, N. (2018). *Design of a fuzzy expert system for assessing the status of IT governance in organizations*. Master's thesis in Information Technology Management (Advanced Systems concentration), Faculty of Social Sciences and Economics at Alzahra University. [in Persian]
- Wulyatiningsih, T., Grivin M. W. & Mambu, J. Y. (2024). Information technology governance analysis using COBIT Framework at Bank Mandiri Girian Bitung Branch *International Journal of Engineering, Science and Information Technology*, 4(4), 211-218. Retrieved from <https://ijesty.org/index.php/ijesty/article/view/642/356>
- Yousefi, F. (2018). *Presentation of a model for employing information technology to enhance enterprise architecture (case study: Red Crescent Society in Shahreza County)*. Master's thesis in Information Technology Engineering with a focus on Management Information Systems at the Faculty of Electrical Engineering and Computer Science. [in Persian]