

Research Article

A Novel Approach to Improving E-Government Performance from Budget Challenges in Complex Financial Systems

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Today, the risk management of budget challenges throughout the budget process is greater than ever. The process of change has been driven by new information and communication technologies, resulting in e-government. The purpose of this scientific paper is to see whether budgetary challenges have an effect on the performance of e-government in complex financial systems based on factors F1, F2, F3, F4, and F5: lack of information, lack of cooperation, lack of resources and reduction of focus, lack of budget experts and financial stability, and shortcomings and inconsistencies during the budget process. Therefore, this study aims to advance the understanding of how to manage risks from budgetary challenges by focusing on a novel approach to improve e-government performance in complex financial systems. Empirical research was based on three key issues: an approach to e-government, analyzing which variables need more attention to risk, and learning how to meet budgetary challenges to improve performance during governance. For this study, the data were conducted by Kosovo’s public institutions, more specifically at the central level (Ministry of Finance) and at the local level (38 municipalities of Kosovo). A total of 38 questionnaires were analyzed and divided into three sessions, which were analyzed through three analyses, such as factor analysis, data reliability analysis, and multiple regression analysis, using SPSS version 23.0 for Windows. The research was conducted over the years 2017, 2018, 2019, and 2020, while the analysis involved several processes, where some of the factors were removed in order to make the model acceptable. In this case, 21 variables were tested and divided into 5 factors. The results showed that special attention should be paid to these factors to reduce budgetary challenges and increase the performance of e-government in complex financial systems, such as (a) lack of resources (staff, funds, infrastructure, tools, etc.), (b) increasing the focus on risk management even after the transfer of funds from the ministry to the municipality, (c) the selection of programs based on priorities and not on the basis of wishes and policies, (d) having political stability, rule of law, and more control, and (e) having regulations and guidelines from the practices of developed countries as well as taking into account the opinions of budget experts. The implications of this paper have to do with only a considerable number of variables, which were taken in the study as well as only in the municipalities of Kosovo. In this case, for other analyses by other researchers, other variables can be analyzed in other countries by making comparisons.

1. Introduction

Risk management is becoming a more and more important tool for budget cuts. Therefore, budget cuts not only reduce the level of resources available to carry out the mission of institutions but also create uncertainty by undermining the ability of institutions to make sound decisions. Effects on institutions include the retirement of key people or budget experts and investments based on judgements and projects,

not priorities. Hence, risk management is essential so that unintended events do not occur [1]. Public finances are a historical category, the consideration of which is placed within analytical frameworks based on efficiency, effectiveness, equity, and economy. According to [2], risk management is a requirement of organizations to meet and exceed financial expectations. The performance of an institution requires in some way the acceptance of risks, but if it takes a risky strategy, it will send the institution into failure. Each

institution faces different types of risks, internal, external, and strategic. This approach is based on the new successful framework supported by the Financial Reporting Council [3]. The budget has been talked about since the time of human existence until now. At every stage, the importance and role of the budget and public money have influenced financial reforms, whether increasing or decreasing performance during budget governance. So, during the interest in the public budget by budget policymakers, there is a need to know many budget theories and analyses, which help to better see the challenges during the budget process and to find the best results for evaluating and improving budget performance in the complex financial systems [4]. The need for effective risk management in government institutions, whether central or local, and the consequences of a failure to adequately address risk are becoming increasingly apparent [5]. The Kosovo budget is prepared by the Ministry of Finance (MoF) in coordination with budget organizations and is approved at the end of the year by the Kosovo Assembly. The budget for next year is prepared in the current year through a chain action known as the budgetary process. Until getting a final form as a draft bill for budget and before presentation for approval in the Parliament, the budget process usually is placed between the Ministry of Finance and budget organizations. The latter conform to instructions from the Ministry of Finance and send their proposals for budget according to the plans and objectives set with the work plan. According to the Law on Public Financial Management and Accountability, "budgetary organization means an authority or public enterprise that directly receives an appropriation." In the process of drafting the budget, the Ministry of Finance and budget organizations act between them in two directions: bottom-up: when budgetary organizations have the freedom of the design of costs and budget requirements depending on their plans; top-down: when budget organizations were allocated a budget taking into account the budget and expenditures of the organization during the previous year, not taking into account the needs for the budget of organizations. As in many countries, Kosovo applies a mixed form of both directions, meaning that budgetary organizations prepare or propose their budget for expenditure during one year (bottom-up direction) but also are limited in this preparation as a result of a budgetary ceiling as recognized in this field (top-down direction) [6]. Analysis of risk management activities and budget cycles reveal that budgeting generally serves as a facilitator and catalyst for risk and disaster management in government institutions [7]. According to [8], in order to avoid the risk in the local budget, they analyzed the participation of citizens in the budget process. Therefore, in order to have fewer budget challenges, it is recommended to increase the number of citizens and advisory committees during the budget process. The classical analysis is often based on combining probability and impact, either using a probability-impact diagram or multiplying both terms to obtain what is called risk critique [9]. Moreover, when risks to budgetary challenges are modeled as independent, it is impossible to properly assess the consequences of indirect complexity on institutions [10]. The local government risk assessment system can provide

signaling guidance and policy references for finance to anticipate the risks of budgetary challenges, to regulate the priority order of debt repayment within the relevant directorates at both levels of government, to optimize the structure of fiscal revenues and expenditures, and so on [11]. A challenge to be considered, according to [12], is local government debt as a major problem in China's financial operations for a long time, and it has also become a key problem that seriously affects the financial risk of governments in any country. The construction of the local government debt risk assessment system should be based on the analysis of the government debt situation, and the risk assessment results should reflect the level of local government debt risk and help the local government to find and resolve risks in a timely manner [13]. According to [14], it is concluded that e-government directly affects the participation of citizens in budget documents and indirectly affects the increase of control, transparency, and accountability. International organizations such as the World Bank and the United Nations define e-government as the adoption and integration of information technologies (Internet, computer, telephone, and other useful networks) within government institutions, transforming relationships with their various clients (citizens, businesses, other government agencies, etc.) [15]. According to [16], the use of machine learning algorithms in complex government decision-making was analyzed, so it is emphasized that decision-makers need to update policies and legislation to ensure whether decisions need to be reapproved. Systematic financial risk is an important challenge in the economy and financial systems that must be managed in order to avoid unforeseen occurrences [17]. According to [18], potential risks in structured financial networks were analyzed through the use of network analysis and machine algorithms. They stressed that this model helps policymakers and investors to use the financial network as a useful tool to improve portfolio selection as risk-free as possible. The model based on sociopolitical development known as the model of maturity is also important in e-government [19]. To manage the risk to prevent budgetary challenges, the e-government framework is important, which describes complex relationships at different stages such as information, communication, transactions, integrations, and participation in e-government. As government evolves through these stages, data collection and privacy risks increase for all types of e-governments. The types of risks from e-government are government that provides services to citizens, government that provides services to individuals as policymakers, government that provides services to businesses, government that provides services to employees, and so on [20]. According to [21], they reported that Asia-Pacific Governments are only in the early stages of adopting technology and communication to improve information and financial reporting, improve government distribution service, improve communication with citizens, and serve as a catalyst for empowering citizens to interact with the government. Therefore, in their paper, they found that the step has been slower in the public sector than in the private sector. Also included are innovative e-government trends, issues, and practices, as well as challenges and opportunities for

e-government development [22]. E-government initiatives are widespread and constitute an important part of the government investment portfolio in almost all countries of the world [23]. In general, the various descriptive models represent linear progress of stages to increase knowledge about risk management through e-government [24]. The use of information and communication technology in public administration is often presented as a multifaceted reform with strong transformative potential to prevent risks from budgetary challenges [25]. E-government during the budget process has been a hot topic in the public administration research community for some time [26]. The literature reports experiences with e-government initiatives during the budget process as chaotic and uncontrollable, despite numerous recent initiatives at various levels of government and academic and practical conferences on e-government [27]. Good e-governance during the budget process refers to the management of public resources by governing authorities [28]. While democratic online engagement is a slowly evolving process, initial steps are being taken by governments that enable e-participation to shape democratic reform [29]. Extensive use of e-government during the budget process can increase government transparency through citizen participation in documents published on institutions' websites. However, beyond this, e-government can be dysfunctional if operational capacity is reduced during the budget process leading to budgetary challenges, in which case there is a need to develop theories, models, and training to help institutions address this challenge [30]. According to [31], in development policy circles, corruption has become an urgent global issue. However, the contemporary relationship between corruption and development is complex and affects budgetary challenges [32]. The disappointing performance of conventional public sector reforms during the budget process in developing countries has led to the emergence of "new" approaches seeking to overcome traditional bureaucratic barriers to change: leadership-focused interventions such as the African Governance Initiative (AGI); accountability-focused initiatives such as the Open Government Partnership (OGP); and adaptation-focused models such as those of the African Power and Politics (APP). Beyond new implementation tactics, however, there is a need for new strategies to manage the risk of budgetary challenges [33]. Does democratization mean faster growth, less corruption, and less inefficiency? Past studies provide unclear results on the effects of democracy on budget performance and economic growth [34]. A more direct relationship between citizens and policymakers in e-government will promote democracy and accountability during the budget process [35]. Data openness has been praised for improving transparency and providing a window into government functioning. Although this relationship is intuitively obvious, it is in fact complex and simply opening the data may not bring transparency during the budget process but may bring new budget challenges [36]. According to [37], they aimed to illustrate the role of e-government in modern management by researching some developed and some developing countries, so the findings show that there is an increase in e-government in developing countries. However, whether e-government will undoubtedly

lead to a more transparent, interactive, open, and consequently accountable government remains a central issue. As the overall levels of accountability increase, the accountability gap between different national bureaucracies often remains intact as web-based technologies typically maintain or reinforce existing practices [38]. Fiscal transparency and citizen participation in budgeting processes are widely promoted as tools towards the goals of accountability and democratic response in the distribution and use of public funds [39]. Financial responsibilities, openness, and transparency initiatives aim to make government controlled by citizens [40]. Some international research has highlighted the consequences of corruption in public services, which affects another budgetary challenge [41]. International construction is complex and involves high risks. However, with the development of technological innovation, Building Information Modeling (BIM) emerged and seemed to be able to address some risks. Understanding BIM applications in international construction risk management requires a more advanced review by governing institutions during the budget process [42]. Compared to traditional e-government, the government has taken a qualitative step in the degree of control automation, service and decision-making intelligence, remote support capability, and the spatial-temporal extent that government can control. Finally, through testing, the government case management system has good stability; there is no overload and delay when many users enter the system, so the speed of response and efficiency of the system essentially meet the requirements of citizens to review the public budget and other financial-budget reports [43]. But in developing countries, financial management and risk assessment skills are insufficient to adapt to the rapidly evolving new environment [44]. E-government provides an opportunity for citizens to have access to budget documents, but not all institutions have published reports and budget documents, which is mismanagement and a budget challenge that needs to be improved [45]. The feedback system and the neighborhood effect are the essential elements that influence the e-government response during the budget cycle [46]. Equal treatment of all citizens is one of the basic principles of good administrative practice. However, there are a growing number of media and scientific reports on unequal treatment by the public administration. Therefore, through a survey conducted with citizens, it turns out that there is discrimination and unequal treatment by government institutions in the unfair distribution of budget projects according to priorities, but the projects are divided based on political beliefs. Governing institutions through e-government need to manage risks from various budgetary challenges by bringing approaches to improve performance in complex financial systems.

Figures 1 and 2 show the e-government chains during the budget process at both levels (central and local). The financial reporting chain at the central level during the budget process starts from the bottom-up, e.g., The Minister of Finance reports to the Government. The Government reports to the Assembly of Kosovo. However, the Assembly reports to the citizens on the performance during the e-government. Again the financial reporting chain during the budget process at the

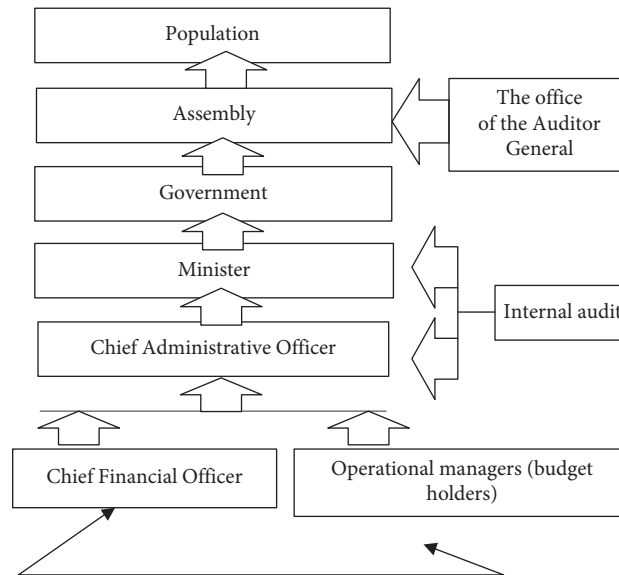


FIGURE 1: The chain of e-government during the budget process at the central level.

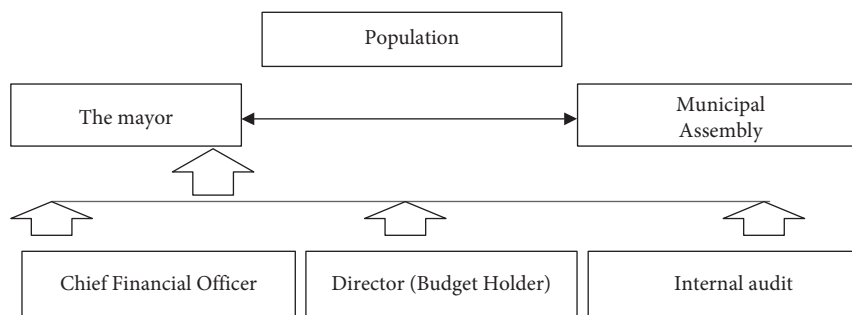


FIGURE 2: The chain of e-government during the budget process at the local level.

local level starts from the bottom-up, for example, internal auditor, finance director, and financial officer, and they report to the Mayor. The Mayor together with the Municipal Assembly reports to the citizens. If there is transparency in financial-budget reporting, then the budget challenges will be smaller, and at the same time, the performance of the Municipality in complex financial systems will increase.

2. Methods and Materials

2.1. The Purpose of the Paper. A research on a new approach to improving e-government performance from budget challenges to complex financial systems in all Kosovo municipalities has not been conducted earlier; therefore, the purpose of this scientific paper is to see if budgetary challenges have an effect on the performance of e-government in complex financial systems based on factors F1, F2, F3, F4, and F5, lack of information, lack of cooperation, lack of resources and reduction of focus, lack of budget experts and financial stability, and shortcomings and inconsistencies during the budget process. Through this goal, based on the factors taken in the study, the hypotheses will be validated. Therefore, this research will (a) bring an approach to e-government, (b) analyze how to manage risk from budget

challenges, in which variables need more attention to risks, and (c) learn something special about how to meet budget challenges to improve e-government performance in complex financial systems.

2.2. Methods. For this study, data were collected from public institutions in the State of Kosovo, more specifically at the central level (Ministry of Finance) and at the local level (38 municipalities of Kosovo). So, the State of Kosovo has 38 municipalities, and the questionnaire was conducted in all municipalities through primary data (questionnaire conducted with mayors, budget directors, financial-budget officials, and treasury officials). All municipalities expressed their willingness to cooperate, and the sample was statistically verified through secondary data (financial-budget reports) and control of each website of Kosovo municipalities looking at the performance of e-government in complex financial systems. A total of 38 questionnaires were analyzed and divided into three sessions, which were analyzed through three analyses, such as factor analysis, data reliability analysis, and multiple regression analysis, using SPSS version 23.0 for Windows. The research was conducted over the years 2017, 2018, 2019, and 2020. The analysis involved

several processes where some of the factors were deleted in order to make the model acceptable, in which case, as stated in the conceptual model, the purpose of these analyses is to obtain reliable data (KMO over the value 0.600, Alpha over the value 0.700, and R^2 over the value 0.800). In this case, 21 variables were tested, which were divided into 5 factors.

2.2.1. Instrument. As stated in the introduction, the main purpose and objective of this research is to find an approach to improve e-governance in the complex financial system through risk management from budget challenges. Are these factors related to each other and do they affect the performance of institutions? Based on these issues, the findings from the econometric models will provide recommendations for Kosovo's institutions.

2.2.2. Data Collection. Data collection was performed from the results of factorial analysis and reliability analysis (KMO, Bartlett test, Sig., Alpha, etc.) as well as regression analysis (R , R^2 , Adjusted R^2 , Std. error of the estimate, F, Sig. F, Durbin-Watson, and ANOCA), which assessed the budget challenges in Kosovo's institutions.

2.2.3. Data Analysis. Research data related to risk management from budget challenges were analyzed through the three analyses mentioned previously.

Hypotheses:

H_0 : budget challenges do not have a negative effect on e-government performance in complex financial systems.

H_A : budget challenges have a negative effect on e-government performance in complex financial systems

$$\beta_0 + \beta_1 (F1) + \beta_2 (F2) + \beta_3 (F3) + \beta_4 (F4) + \beta_5 (F5) + \mu \quad (1)$$

Factors:

Factor 1 (F1): lack of accurate information and ineffective decision-making for risk management during the budget process as a budget challenge to improving e-government performance in the complex financial system.

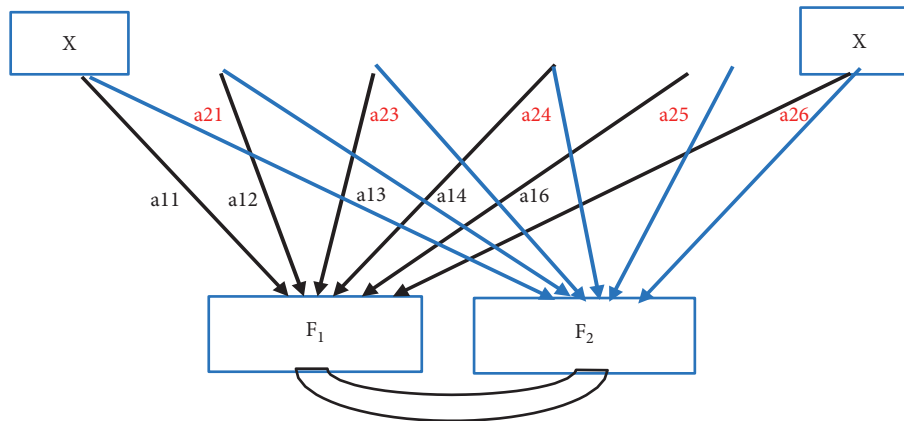
Factor 2 (F2): lack of cooperation for risk management during the budget process as a budget challenge to improving e-government performance in the complex financial system.

Factor 3 (F3): lack of resources and reduction of focus (cooperation) for risk management during the budget process as a budget challenge to improving e-government performance in the complex financial system.

Factor 4 (F4): lack of budget experts and stability for risk management during the budget process as a budget challenge to improving e-government performance in the complex financial system.

Factor 5 (F5): shortcomings and inconsistencies during the budget process as a budget challenge to improving e-government performance in the complex financial system.

2.3. Materials. Analyses are factorial analysis, reliability analysis, and multiple regression analysis.



From original n -variables $x_1, x_2, x_3, \dots, x_k$, k new variables F_1, F_2, \dots, F_k were obtained:

$$\begin{aligned} F_1 &= \alpha_{11}x_1 + \alpha_{12}x_2 + \alpha_{1k}x_k, \\ F_2 &= \alpha_{21}x_1 + \alpha_{22}x_2 + \alpha_{2k}x_k, \\ F_k &= \alpha_{k1}x_1 + \alpha_{k2}x_2 + \alpha_{kk}x_k, \end{aligned} \quad (2)$$

where $F1$ indicates as much variance as possible to the budgetary budget challenges and $F2$ indicates the remaining variance, using k for each of the predictor variables on how to manage risk from budget challenges for x_1, x_2 , and x_3 , for each level (n). Then, X_{ij} represents levels i and j for the predicted variables of X_j . Observations Y_1, Y_2, \dots, Y_n , for each n level are presented through the following equation to e-government in complex financial systems:

$$\begin{aligned}
Y_1 &= \beta_0 + \beta_1 x_{11} + \beta_2 x_{12} \cdots + \beta_k x_{1k} + \mu_1, \\
Y_2 &= \beta_0 + \beta_1 x_{21} + \beta_2 x_{22} \cdots + \beta_k x_{2k} + \mu_2, \\
Y_i &= \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} \cdots + \beta_k x_{ik} + \mu_i, \\
Y_n &= \beta_0 + \beta_1 x_{n1} + \beta_2 x_{n2} \cdots + \beta_k x_{nk} + \mu_n.
\end{aligned} \tag{3}$$

The system of equations n presented above is represented by the matrix symbol, as in the following equation risk management from budget challenges [47]:

$$Y = x\beta + \mu,$$

$$Y = \begin{bmatrix} Y_1 \\ Y_2 \\ Y_3 \\ \vdots \\ Y_n \end{bmatrix} x = \begin{bmatrix} 1 & x_{11} & x_{12} & \cdots & x_{1n} \\ 1 & x_{21} & x_{22} & \cdots & x_{2n} \\ 1 & x_{31} & x_{32} & \cdots & x_{3n} \\ \cdot & \cdot & \cdot & \cdots & \cdot \\ \cdot & \cdot & \cdot & \cdots & \cdot \\ 1 & x_{n1} & x_{n2} & \cdots & x_{nn} \end{bmatrix} \beta = \begin{bmatrix} \beta_1 \\ \beta_2 \\ \beta_3 \\ \cdot \\ \beta_n \end{bmatrix} \mu = \begin{bmatrix} \mu_1 \\ \mu_2 \\ \mu_3 \\ \cdot \\ \mu_n \end{bmatrix}. \tag{4}$$

The mathematical equation explains the division of analysis factors into 6 factors, where each of these factors has of great importance in managing the risk of budgetary challenges to bring performance to governing institutions.

3. Result and Discussion

In this research, as discussed in the methodology, three econometric analyses are included: factorial analysis, data reliability analysis, and multiple regression analysis.

3.1. Results from Factorial Analysis and Reliability Analysis. Through data processing from 21 variables, five factors (F1, F2, F3, F4, and F5) and their subfactors were obtained as follows:

Factor 1 (F1): lack of accurate information and ineffective decision-making for risk management during the budget process as a budget challenge to improving e-government performance in the complex financial system.

3.1.1. Variables

Subfactor F1.1. Unrealistic and inaccurate information:

- (i) Q1. Do unclear policy budgeting programs for public expenditures and revenues make it difficult to determine budget performance? (Q1F1.1).
- (ii) Q2. The lack of accurate and timely data in monthly, quarterly, semiannual, and annual reports to serve as input during the budget process has reduced the performance (Q2F1.1).
- (iii) Q3. Poor performance stems from ineffective decision-making from planning to budget implementation as well as to inadequate financing of operations, poor control, unpredictable expenditures, and so on (Q3F1.1).

- (iv) Q4. Financial reforms are unsustainable and political (Q4F1.1).

Subfactor F1.2. Ineffective decision-making during the budget process:

- (i) Q5. Lack of resources (staff, funds, infrastructure, tools, etc.) a challenge to pay attention to? (Q5F1.2).
- (ii) Q6. Poor management and inefficient decision-making during the budget process affect performance (Q6F1.2).
- (iii) Q7. Providing unrealistic and inaccurate information during the budget process is a challenge that affects performance (Q7F1.2).

Factor 2 (F2): lack of cooperation for risk management during the budget process as a budget challenge to improving e-government performance in the complex financial system.

3.1.2. Variables

Subfactor F2.1. Lack of cooperation during the budget process:

- (i) Q12. Discrepancies between the local budget of the respective directorates make it difficult to assess budget performance (Q12F2.1).
- (ii) Q10. If there is no budget performance, there will be consequences for programs, intensive monitoring, budget reduction, and so on (Q10F2.1).
- (iii) Q14. Are risk management austerity measures applied in case of budget challenges? (Q14F2.1).
- (iv) Q19. Poor performance results from ineffective decision-making throughout the budget process regarding inadequate financing of operations, poor control, unpredictable expenditures, and so on (Q19F2.1).
- (v) Q20. After the budget is allowed by the Ministry for the Municipality, does the focus decrease on increasing performance and transparency during governance? (Q20F2.1).

Subfactor F2.2. Lack of supervision:

- (i) Q18. Lack of oversight during the budget process affects inefficiency in public revenues and expenditures (Q18F2.2).

Factor 3 (F3): lack of resources and reduction of focus (cooperation) for risk management during the budget process as a budget challenge to improving e-government performance in the complex financial system.

3.1.3. Variables

Subfactor F3.1. Lack of resources and reduction of focus (collaboration) during the budget process:

- (i) Q11. Risk of reduction performance due to lack of resources and poor cooperation (Q11F3.1).
- (ii) Q6. Poor management and inefficient decision-making during the budget process affect performance (Q6F3.1).
- (iii) Q12. Discrepancies between the local budget of the respective directorates make it difficult to assess budget performance (Q12F3.1).
- (iv) Q8. After the budget is allowed by the Municipality for the Directorate, does the focus decrease on increasing performance and transparency during governance? (Q8F3.1).
- (v) Q9. The selection of funding programs based on bias rather than priorities has reduced performance and transparency (Q9F3.1).

Factor 4 (F4): lack of budget experts and stability for risk management during the budget process as a budget challenge to improving e-government performance in the complex financial system.

Subfactor F4.1. Budget experts and stability for risk management.

3.1.4. Variables

- (i) Q15. Qualified budget staff affects the increase of budget performance. Is the number of qualified employees dedicated to the budget sufficient? (Q15F4.1).
- (ii) Q13. The lack of positive government results in budget and grant management has reduced performance (Q13F4.1).
- (iii) Q16. Does accountability, political stability, effectiveness, rule of law, and control affect budget performance during governance? (Q16F4.1).

Factor 5 (F5): shortcomings and inconsistencies during the budget process as a budget challenge to improving e-government performance in the complex financial system.

Subfactor F5.1. Shortcomings and inconsistencies.

3.1.5. Variables

- (i) Q7. Providing unrealistic and inaccurate information during the budget process is a challenge that affects performance (Q7F5.1).
- (ii) Q17. Discrepancies between the central and local budgets (expenditures, revenues) make it difficult to assess the performance (Q17F5.1).
- (iii) Q21. Lack of regulations, guidelines, funds, budgetary practices has reduced performance during governance (Q21F5.1).

The first factor (F1) has contributed to OECD [48], which made analysis in the countries that are members of the OECD regarding how information is used in budget

decision-making. So according to the findings, it was emphasized that most countries are engaged in providing information to inform and not determining budget allocation, and nonuse of information is the lack of a method to integrate it in the budget process. The second factor (F2) has contributed to OECD [49], which pointed out cooperation during the budget process is an active approach that can help the budget process by creating better budget documents and that will increase performance. The third factor (F3) has contributed to OECD [50], which stressed that governments continue to “provide” services although it is clear to the population or service users that they lack the means to do so and, as a result, coverage is dependent and the quality of services is poor. Therefore, this overexpansion of human and financial resources is one of the main causes of government failure in developing countries. The fourth factor (F4) has contributed to OECD [51], which stressed that it should increase the performance in EU countries for the functioning of the budget through public accountability as well as through increasing confidence in the allocation of budget funds. Regarding the fifth factor (F5), government budgets are based on revenue and expenditure forecasts. These forecasts are subject to stochastic error and strategic manipulation during governance. According to [52], in their analysis, they pointed out that circumstantial evidence in the budget literature and popular media suggests that government officials routinely circumvent budget-based forecasts. In the countries in which they analyzed budgets, they were systematically pessimistic, revenues were underestimated, and expenditures were overestimated.

Table 1 shows data from the KMO test for factors F1, F2, F3, F4, and F5 (0.719, 0.718, 0.801, 0.815, and 0.754 > 0.50, Sig. 0.000) and also data from Alpha coefficients (0.854, 0.820, 0.815, 0.887, and 0.867 $\leq \alpha \leq 1.00$). The first factor (F1) includes two subfactors (F1.1 and F1.2). In the first factor, the subfactor Q1F1 has the highest value Q1F1 = 0.893 (Do unclear policy budgeting programs for public expenditures and revenues make it difficult to determine budget performance), while the subfactor Q4F1 has the lowest value Q4F1 = 0.642 (Financial reforms are unsustainable and political). The second factor (F2) includes two subfactors (F2.1 and F2.2). In the second factor, the subfactor Q12F2.1 has the highest value Q12F2.1 = 0.909 (Discrepancies between the local budget of the respective directorates make it difficult to assess budget performance), while the subfactor Q20F2.1 has the lowest value Q20F2.1 (After the budget is allowed by the Ministry for the Municipality, does the focus decrease on increasing performance and transparency during governance). The third factor (F3) includes a subfactor. The subfactor Q11F3.1 has the highest value Q11F3.1 = 0.813 (Risk of reduction performance due to lack of resources and poor cooperation), while the subfactor Q9F3.1 has the lowest value Q9F3.1 = 0.698 (The selection of funding programs based on bias rather than priorities has reduced performance and transparency). The fourth factor (F4) includes a subfactor. The subfactor Q15F4.1 has the highest value Q15F4.1 = 0.856 (Qualified budget staff affects the increase of budget performance. Is the number of qualified employees dedicated to the budget sufficient?),

TABLE 1: . Factor analysis and data reliability analysis for all factors (F1, F2, F3, F4, and F5).

| KMO and Bartlett's test | | Factor analysis | | | | Reliability analysis |
|--|-------------------------------|--|--|---|------------------|----------------------|
| Denominations | Results | Factor 1 | Subfactor 1.1 | Subfactor 1.2 | Cronbach's alpha | |
| Kaiser-Meyer-Olkin measure of sampling adequacy. | 0.719 | The lack of accurate information and ineffective decision-making for risk management during the budget process as a budget challenge to improving e-government performance in the complex financial system | Unrealistic and inaccurate information | Ineffective decision-making during the budget process | 0.854 | |
| Bartlett's test of sphericity approx. chi-square | 135.710 | Var Q1F1 Q2F1 Q3F1 Q4F1 Q5F1 Q6F1 Q7F1 | 0.893 0.833 0.793 0.642 0.220 0.131 0.158 | 0.335 0.289 -0.077 0.447 0.909 0.867 0.728 | | |
| df | 21 | Sub-factor | | | | |
| Sig. | 0.000 | Unrealistic and inaccurate information | Results | | Cronbach's alpha | |
| KMO Bartlett's test | 0.740 83.588 | Var Q1F1.1 Q2F1.1 Q3F1.1 Q4F1.1 | 0.959 0.889 0.775 0.692 | | 0.849 | |
| df | 6 | Var | | | | |
| Sig. | 0.000 | Var | | | | |
| Denominations | Results | Subfactor | Results | Results | Cronbach's alpha | |
| KMO Bartlett's test | 0.846 43.021 | 1.2 Var Q5F1.2 Q6F1.2 | 0.927 0.877 0.790 | | 0.832 | |
| df | 3 | Var | | | | |
| Sig. | 0.000 | Var | | | | |
| Denominations | Results | Factor 2 | Sub-factor 2.1 | Sub-factor 2.2 | Results | |
| Kaiser-Meyer-Olkin measure of sampling adequacy | 0.718 | Lack of cooperation for risk management during the budget process as a budget challenge to improving e-government performance in the complex financial system | Lack of cooperation during the budget process | Lack of supervision | | |
| Bartlett's test of sphericity approx. chi-square | 74.201 | Var Q12F2.1 Q10F2.1 Q14F2.1 Q19F2.1 Q20F2.1 Q18F2.2 | 0.909 0.773 0.749 0.729 0.717 0.355 | 0.236 -0.296 -0.288 -0.384 0.298 0.835 | 0.820 | |
| df | 15 | Var | | | | |
| Sig. | 0.000 | Var | | | | |

TABLE 1: Continued.

| KMO and Bartlett's test | | Factor analysis | | Rotated component matrix | Reliability analysis |
|-------------------------|-------------------------------|---|---|--|----------------------|
| | | | | Subfactor 3.1 | Cronbach's alpha |
| | | Factor 3 | | | Results |
| Denominations | Results | Lack of resources and reduction of focus (cooperation) for risk management during the budget process as a budget challenge to improving of e-government performance in the complex financial system | | Lack of resources and reduction of focus (collaboration) during the budget process | |
| KMO Bartlett's test | 0.801 63.727 | Var | Q11F3.1 Q6F3.1 Q12F3.1 Q8F3.1 Q9F3.1 | 0.813 0.809 0.752 0.720 0.698 | 0.815 |
| df | 10 | | | | |
| Sig. | 0.000 | | | | |
| | | Factor 4 | | Sub-factor 4.1 | Results |
| Denominations | Results | Lack of budget experts and stability for risk management during the budget process as a budget challenge to improving of e-government performance in the complex financial system | | Budget experts and stability for risk management | |
| KMO Bartlett's Test | 0.815 17.246 | Var | Q15F4.1 Q13F4.1 Q16F4.1 | 0.856 0.811 0.680 | 0.887 |
| df | 3 | | | | |
| Sig. | 0.001 | | | | |
| | | Factor 5 | | Subfactor 5.1 | Results |
| Denominations | Results | Shortcomings and inconsistencies during the budget process as a budget challenge to improving of e-government performance in the complex financial system | | Shortcomings and inconsistencies | |
| KMO Bartlett's test | 0.754 17.487 | Var | Q7F5.1 Q17F5.1 Q21F.1 | 0.881 0.781 0.652 | 0.867 |
| df | 3 | | | | |
| Sig. | 0.001 | | | | |

Values that are presented in bold are values that confirm the importance of the test. Example: (i) The KMO test to be accepted must have a value above 0.50. All factors have a value higher than 0.50 (data are suitable for factor analysis); (ii) Reliability analysis (alpha test must be above 0.60 to be accepted). And so on. Therefore, all the results made in bold are important and confirm the model. Those that have not been verified have been further processed through other tests or removed from the model indicating their irrelevance.

TABLE 2: Multiple regression analysis.

| Multiple regression analysis | | | | | | | | | | |
|------------------------------|---------------|----------------|---------------------|------------|-------|---------------------------|------|------|-------|---------------|
| Model | Model summary | | | | | Change statistics (ANOVA) | | | | |
| | R | R ² | Adj. R ² | Std. error | R sq. | F | df 1 | df 2 | Sig. | Durbin-Watson |
| 1 | 0.991 | 0.987 | 0.983 | 0.07517 | 0.987 | 367.736 | 5 | 28 | 0.000 | 1.209 |

TABLE 3: Coefficients table and proof of hypotheses.

| Coefficients table | | | | | | | Proof of hypotheses | |
|---------------------------------|-------------|--------------|--------------|--------------|--------------|--------------|---------------------|--|
| | | Model | | | | | | |
| | | Constant | F1 | F2 | F3 | F4 | | |
| Unstandardized coefficient | B | 0.135 | 0.415 | 0.326 | 0.335 | 0.242 | 0.192 | $\hat{y} = \alpha_0 + \beta_1 (F1) + \beta_2 (F2) + \beta_3 (F3) + \beta_4 (F4) + \beta_5 (F5) = 0.135 + 0.415x_1 + 0.326x_2 + 0.335x_3 + 0.242x_4 + 0.19x_5 + 0.01\mu$ Reliability interval 95% (Sig.2-tailed), $p \leq 0.01$, p value is less than the level of importance 5%. In this case, rejected H_0 and accepted H_A $(\beta_1, \beta_2, \beta_3, \beta_4, \beta_5 \neq 0)$ |
| Standardized coefficient | Beta | | 0.407 | 0.192 | 0.246 | 0.314 | 0.018 | |
| t | | 2.175 | 10.182 | 6.764 | 10.972 | 10.078 | 0.070 | |
| Sig. | | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | |
| 95.0% confidence interval for B | Lower bound | 0.010 | 0.252 | 0.137 | 0.158 | 0.193 | 0.064 | |
| | Upper bound | 0.339 | 0.378 | 0.256 | 0.231 | 0.291 | 0.060 | |
| Collinearity statistics | Tolerance | | 0.335 | 0.290 | 0.547 | 0.492 | 0.236 | |
| | VIF | | 0.983 | 0.448 | 0.830 | 0.931 | 0.630 | |

Values written in bold are important to the model as explained in the results of this table.

while the subfactor Q16F4.1 has the lowest value $Q16F4.1 = 0.680$ (Does accountability, political stability, effectiveness, rule of law, and control affect budget performance during governance). The fifth factor (F5) includes a subfactor. The subfactor Q7F5.1 has the highest value $Q7F5.1 = 0.881$ (Providing unrealistic and inaccurate information during the budget process, a challenge that affects performance), while the subfactor Q21F5.1 has the lowest value $Q21F5.1$ (Lack of regulations, guidelines, funds, and budgetary practices have reduced performance during governance). All of these factors need to be considered to manage the risk of budgetary challenges as an approach to improving e-government performance in complex financial systems. The Alpha coefficient has very high reliability for all factors (F1, F2, F3, F4, and F5), which means that the variables of these factors need to be improved as emphasized in the factor analysis.

3.2. Result from Multiple Regression Analysis. Through data processed from 21 variables for 5 factors from the two previous analyzes, the findings resulted as follows.

Table 2 shows that 99% ($R^2 = 0.987$, Sig. = 000, and $F = 367.736$) for risk management from budget challenges depends on independent variables F1 (lack of accurate information and ineffective decision-making), F2 (lack of cooperation), F3 (lack of resources and reduction of focus), F4 (lack of budget experts), and F5 (deficiencies and inconsistencies), while 1% depends on other variables outside this model by random error. Adjusted R Sq. at a value of 0.983 indicates that 98% of the variables are related to the model, while according to the D-W test (1.209), the model is

significant and the autocorrelation is negative, which means that the standard error of the coefficient b is very small.

Table 3 shows the parameter values of the predicted model results and the t values by analyzing them for each variable at the 5% significance level. The constant in the value of 0.135 indicates that if the budget challenges during the budget process based on F1, F2, F3, F4, F5 are zero, their accuracy is 14%. If the approach to improve the performance of e-government in complex financial systems is done in accordance with independent variables, the accuracy will be 152%, which means that if the risk from budgetary challenges is managed as lack of accurate information and ineffective decision-making = 42%, lack of cooperation = 33%, lack of resources and reduction of focus = 34%, lack of budget experts = 24%, and shortcomings and inconsistencies = 19%, performance during the budget process will increase. The Beta coefficient indicates that all independent variables are significant in the model, but the most important variable is $F1 = 42\%$. Collinearity statistics, including tolerance values and VIF ($0.335 = 0.983$, $0.290 = 0.448$, $0.547 = 0.830$, $0.492 = 0.931$, and $0.236 = 0.630$), are important in the model because it does not make the problem of multiple relationships between independent variables.

Figure 3 shows that the scatterplot for the first factor (F1) includes two subfactors (F1.1 and F1.2); according to these subfactors, it is emphasized that unclear income and expenditure programs as well as unstable financial and political reforms hamper performance in complex systems financial ($Q1F1 = 0.893$; $Q4F1 = 0.642$).

Figure 4 shows that the scatterplot for subfactor (F1.1) includes variables Q1F1.1, Q2F1.1, Q3F1.1, and Q4F1.1; according to these variables, it is emphasized that there is a

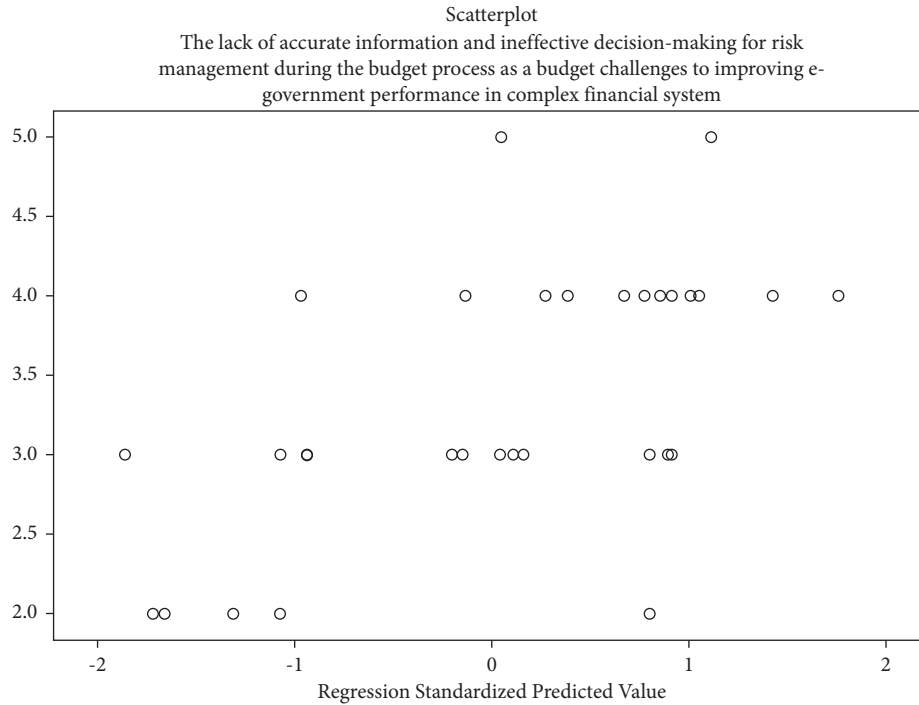


FIGURE 3: Factor 1: lack of accurate information and ineffective decision-making for risk management during the budget process as a budget challenge to improving e-government performance in the complex financial system.

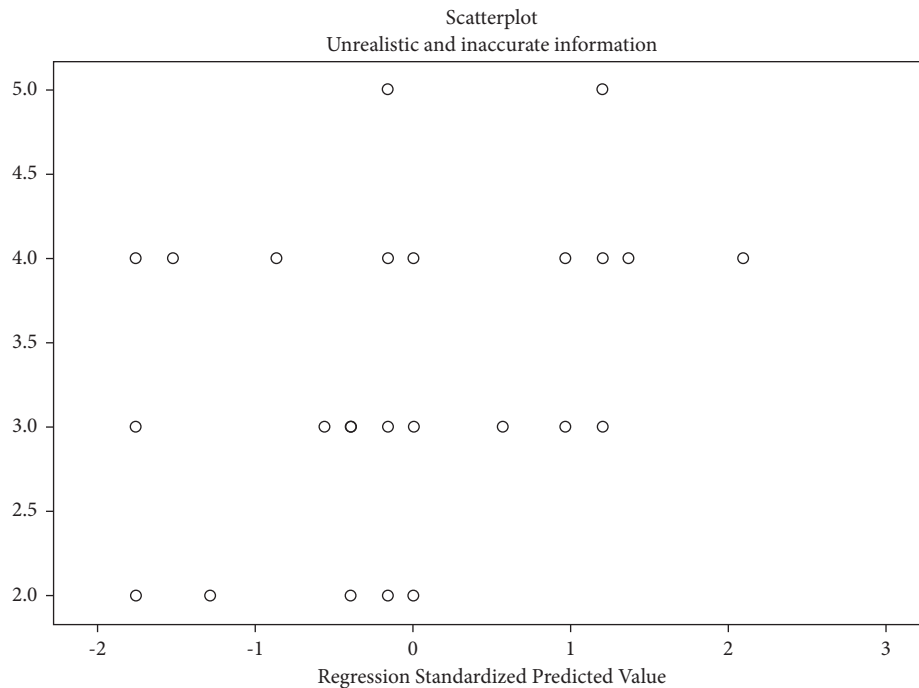


FIGURE 4: The first subfactor of the first factor: unrealistic and inaccurate information.

lack of accurate and timely data in all financial reports, there is ineffective decision-making, budget control is weak, spending is often unpredictable, and reforms are unstable and political. All of these variables need to be considered for performance in complex financial systems.

Figure 5 shows that the scatterplot for subfactor (F1.2) includes variables Q5F1.2, Q6F1.2, and Q7F1.2; according to these variables, it is emphasized that attention should be paid to the lack of resources (staff, funds, infrastructure, tools, etc.) as well as poor and inefficient management; also

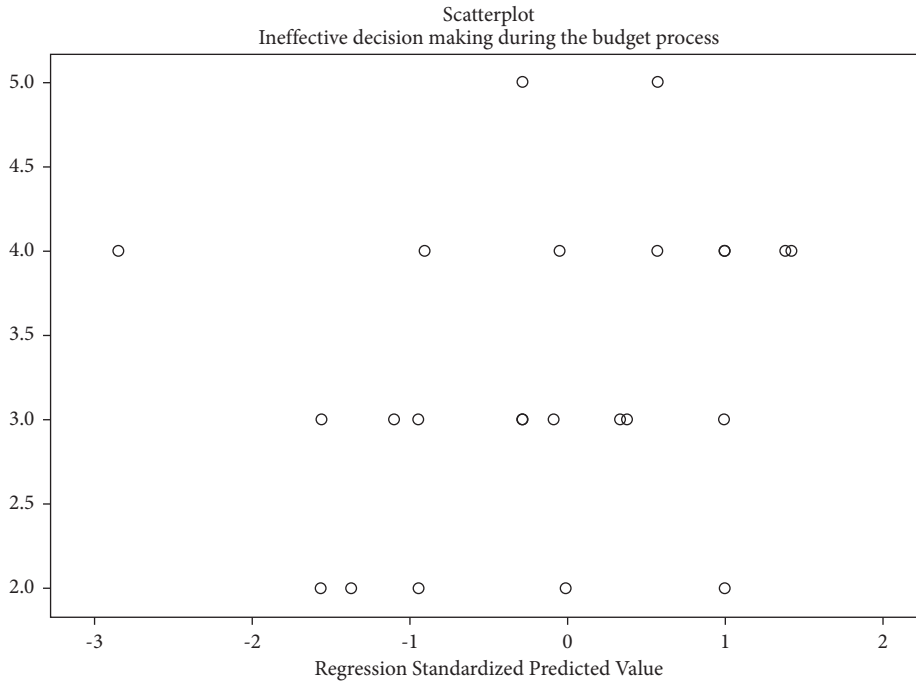


FIGURE 5: The second subfactor of the first factor: ineffective decision-making during the budget process.

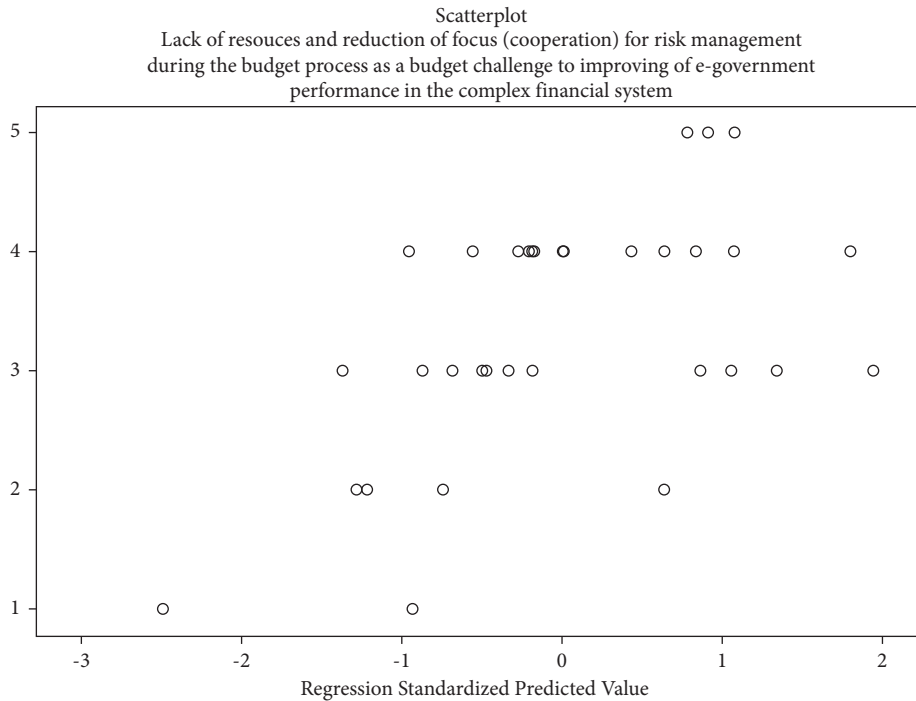


FIGURE 6: Factor 2: lack of cooperation for risk management during the budget process as a budget challenge to improving e-government performance in the complex financial system.

accurate information must be provided during the budget process. All of these variables need to be considered for performance in complex financial systems.

Figure 6 shows that the scatterplot for the second factor (F2) includes two subfactors (F2.1 and F2.2); according to these

subfactors, it is emphasized that budget inconsistencies in the relevant directorates within municipalities and the reduction of focus after the budget are transferred from the Ministry of Finance to the Municipality; they reduce performance in complex financial systems (Q12F2.1 and Q20F2.1).

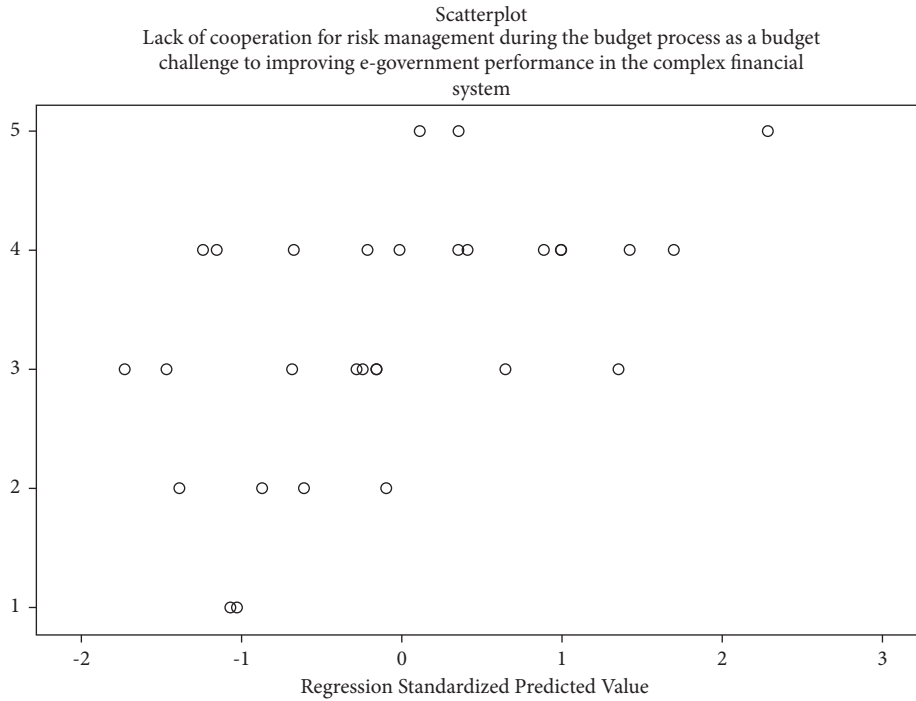


FIGURE 7: Factor 3: lack of resources and reduction of focus (cooperation) for risk management during the budget process as a budget challenge to improving e-government performance in the complex financial system.

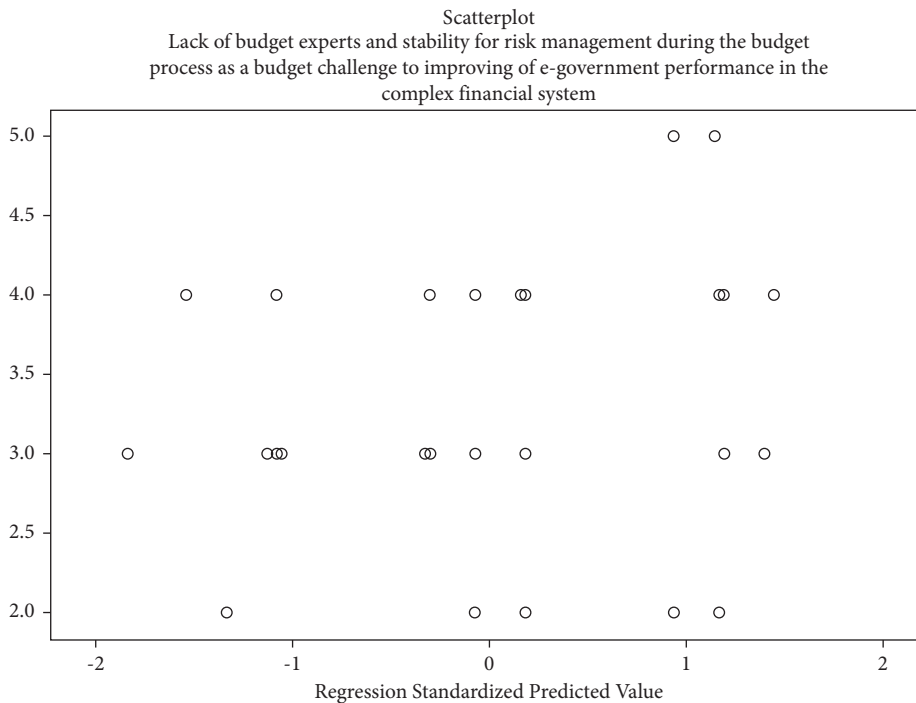


FIGURE 8: Factor 4: lack of resources and reduction of focus (cooperation) for risk management during the budget process as a budget challenge to improving e-government performance in the complex financial system.

Figure 7 shows that the scatterplot for the third factor (F3) includes a subfactor (F3.1); according to this subfactor, it is emphasized that poor cooperation and lack of resources,

as well as the selection of programs based on preferences and not on priorities, reduce performance in complex financial systems (Q11F3.1 and Q9F3.1).

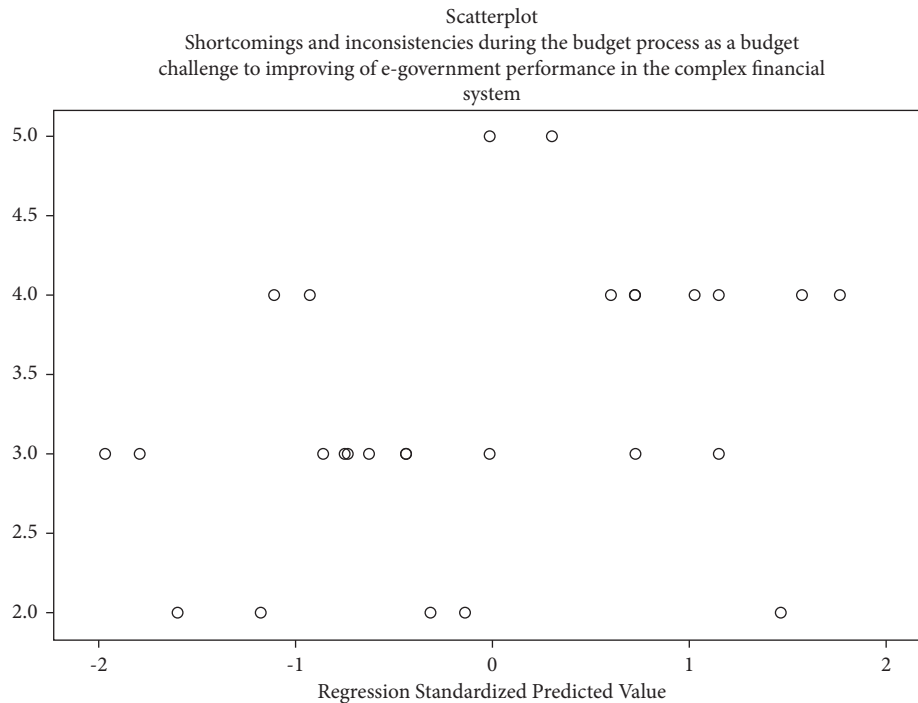


FIGURE 9: Factor 5: shortcomings and inconsistencies during the budget process as a budget challenge to improving e-government performance in the complex financial system.

Figure 8 shows that the scatterplot for the fourth factor (F4) includes a subfactor (F4.1); according to this subfactor, it is emphasized that an insufficient number of staff, poor accountability, nonpolitical stability, inefficiency, not the rule of law, and noncontrol reduce performance in complex financial systems (Q15F4.1 and Q16F4.1).

Figure 9 shows that the scatterplot for the fifth factor (F5) includes a subfactor (F5.1); according to this subfactor, it is emphasized that the lack of regulations, guidelines, practices, funds, and accurate information during the budget process reduce performance in complex financial systems (Q7F5.1 and Q21F5.1).

4. Conclusion

The budget is increasingly becoming the main tool for the financial management of the country as a whole. Therefore, risk management contributes significantly to the performance of e-government in complex financial systems, especially in the case of risk management from budgetary challenges to Kosovo institutions, where the magnitude of the risk of a challenge may jeopardize the health or performance of a Municipality or Ministry. The main goals of risk management from the main challenges are fewer execution rules and more coordination and focus rules. Therefore, the results of this research are easy to understand and apply. The main originality of this research was to combine the conceptual methodology with the managerial one in order for Kosovos' institutions to benefit from their advantages through the results from factorial analysis, reliability analysis and multiple

regression analysis in Tables 1–3 and in Figures 1–9 which provide an approach to managing risk from budgetary challenges as well as to improve government performance in complex financial systems. Hence, a novel has been proposed to improve performance and decide which variables should be taken into account by local levels of government in Kosovo, such as F1, lack of information and ineffective decision-making; F2, lack of cooperation; F3, lack of resources and reduced focus; F4, lack of budget experts; F5, shortcomings and inconsistencies. In perspective, risk management skills from budget challenges bring positive value to institutions. But, other techniques, methodologies, and philosophies exist from other researches to apply the principles of e-government in complex financial systems. Given the main goals mentioned in the methodology part, which variables need to be managed more carefully to manage the risk to bring budget performance? Hence, it was concluded that the variables Q5F1, Q20F2.1, Q9F3.1, Q16F4.1, and Q21F5.1 should be improved by the institutions in Kosovo. Another perspective for e-government is the implementation of applications that help manage risks from budget challenges, as well as finally modeling the interdependence between more than two risks from budget challenges; for example, if the institution combines two risks, then these two risks may bring a third. As general recommendations for Kosovo's public institutions that have resulted from this research are as follows: (a) improve the lack of resources (staff, funds, infrastructure, tools, etc.), (b) not to reduce the focus on performance enhancement and risk management, after the budget is transferred from the ministry to the municipality, (c) the selection of programs to be funded

should not be based in prejudices but in priorities, (d) there should be political stability, rule of law, and control in order to avoid risks from budgetary challenges and increase performance, and (e) have more regulations and guidelines from the practices of developed countries, and take into account the opinions of experts budget on how to overcome challenges to e-government. The implications of this paper are that only a considerable number of variables are taken into the study and only the municipalities in Kosovo. In this case, for other analyses by other researchers, other variables can be analyzed.

Data Availability

The data used to support and prove the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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