

Identification and Prioritization of the Challenges Threatening Tax Affairs Organizations at the Time of Budget Deficit with a Fuzzy Approach

**Mohamad Reza Olian Nejad¹ Faculty Member
management of Khatam Anbia University, Tehran, Iran.**

Abstract

In today's economic conditions in which the tax revenues are an important source of income for the countries, urgent need for transparency in the activities of tax affairs is more manifest than before. The current study aimed at identification and prioritization of the challenges threatening Tax Affairs Organizations at the time of budget deficit with a fuzzy approach. Firstly, by the use of experts' ideas and in two stages of screening program, the most critical risks are identified. The most critical risks to the main activities of the organization are investigated and analyzed using failure modes and effects techniques analysis and finally, through the fuzzy risk assessment and Grey theory, the most critical risks are ranked. As a result, among the more effective groups in risk creation, the organization internal factors with 71.4% of the cases, is more important than the others groups.

Keywords

Risk management, Risk assessment, Failure Mode and Effects Analysis (FMEA) Fuzzy, Grey theory

Introduction

Today, in developed countries, taxes as one of the pillars of the funds, is of particular interest of the managers. The Tax Affairs Organization task is the enforcement of tax law and the tax experts are the pioneers of gaining the tax revenues. If the material needs of these experts are not met reasonably, the ground for the illegal acts and corruption such as bribery will be paved. Therefore, the risks of fund and budget deficit of this organization must be identified and the plans for obviating them should be provided, so nothing would interfere with obtaining tax revenue, which is one of the pillars of the country's development. Taxes are the main source of state authority financing costs in each country. Given that in Iran, the state budget depends on revenues from oil and natural resources sale, the role of taxation in financing the government and its administration is not as manifest as it deserves to be. The tax capacity as the volume of tax payments, that society should pay, is somehow high and this capacity is dependent on the revenues, expenses and investments on one hand, and on the other hand, it is connected to the long-term and midterm goals of short-term plans (Mahjubi, 2011). Scientifically, numerous research has been conducted on the budget, budgeting, taxation and its impact on the state budget and tax corruption prevalent in organizations, however no research addressing the effects of state organizations budget deficit on their performance, have been conducted. The current study aimed at identification and prioritization of the challenges threatening tax authorities at the time of budget deficit, with a fuzzy approach. In this regard, the research question is "what are the main risks threatening the tax affairs organizations and how are they prioritized?".

So, the current study aimed at identification and prioritization of the challenges threatening tax authorities at the time of budget deficit, with a fuzzy approach using the FMEA, in order to help increase the tax revenues.

Review of Related Literature

a) Budget and Tax:

Budgets have been set-out and prepared with the advent of the states and there's a long history of its original form in Iran. Iranians have had expertise in statecraft, the offices of the Court, the tribute, the customs duties, and the implementation of the financial principles. Many nations have learned the work of the Court from Iranians. The budget is the government's lifeline since it conducts all its financial activities, including earning revenues and paying for the various programs within the framework of the budget law (Soleimani, 2007). In the specialized texts, the budget is defined as a document which contains the words and figures that relates the costs to the specific objectives. The budget creates a continuum between funds and human behavior, in order to achieve the goals and policies. Thus, budgeting is the transformation of financial resources into human purposes. In other words, budget is a set of goals and plans with their respective fees (Soleimani, 2007). Budgeting system as a critical tool for planning the government's operations and activities has undergone important steps and developments parallel with the development of state and society. Today, budgeting system is a complex system of plans and programs and budget, in addition to the political and economic role, has taken a critical role in planning and nowadays, it reflects a variety of political, economic, social and cultural planning (Soleimani, 2007). Meanwhile, tax is one of the most important sources of revenue for the budget in each country. Tax, is the legal and financial commitment of individuals to the state. In fact, tax is a social right on those who live and work in the shadow of the blessings of society or it is a share of the work and efforts of people which belongs to the society (Ghorbani, 2010). In other words, tax is a form of payment by individuals to the state (for the use of public facilities and services) (Taylor, 1998). Segmentation of taxes to the indirect and direct taxes is the most common categorization at the state and international statistics. In Iran also, the tax revenues are divided into two mentioned groups in the first classification (Zanjani & Dehghani, 2007).

b) Risk

According to the standard definition of "Project Management Body of Knowledge", the risk is "an uncertain event that if happened, may lead to one or more positive or negative effects on the project's target". According to this standard, risk management is a systematic process which is developed and implemented with the aim of increasing the positive effect of risk (chance) and reducing the negative effects (threats). According to this standard, risk management includes the followings: Risk Management Plan, Risk Identification, Qualitative Risk Analysis, Quantitative Risk Analysis, Risk Response Planning, and Risk Monitoring and Control. The following figure briefly describes the mentioned expressions (Project Management Institute (PMI), (<http://www.pmi.org/>)).

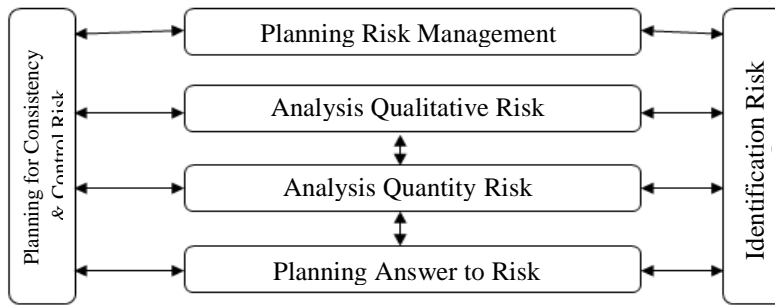


Figure 1: risk management model (PMI Website)

Risk management is a systematic process to identify, analyze and respond to project management which includes maximizing the probability of positive events and their consequences, and minimizing the probability of occurrence of adverse events and their results (Olfat et al, 2010).

c) Types of Risks

The risks affecting the projects, based on the standard of "Project Management Body of Knowledge", can generally be divided into the following four groups:

External risk: external risks are out of the scope of project managers' authority. The project managers must be prepared to cope with this type of risks and minimize or eliminate their effects as much as possible. Among the most important external risks, the changes in monetary and fiscal policy, the stock market, inflation, tax rates, environmental factors (climate), social events, rules and regulations, and suppliers and distributors can be noted. **Organization Internal Risks:** these risks usually arise from the lack of institutional resources and if a proper plan is not proposed to reduce or eliminate them, the project will face delay. Lack of organizational priorities in project implementation, lack of resources and dependencies of the project are among the important examples of this type of project risks.

Technical- Quality- Functional Risks: these risks arise from the technologies used in the project or its environment. For example, the technical risks include the design and production. Requirements, technology, complexity, performance, reliability and quality are also among these risks.

Project Management Risks: Lack of allocation of time, money and suitable work resources, the use of inappropriate programs, insufficient attention to achieving the goals of project management, and poor communication and management are examples of this group of risks (Olfat et al, 2010).

d) Risk Assessment Technique:

In the FMEA technique, the risk ranking is determined for prioritization to each failure mode. The method of Risk Prioritization Number (RPN) system is obtained by multiplying the scores of three factors. These factors include failure possibility (risk possibility: P), failure severity (risk severity: S), and discovery ability (the ability of predicting the risk before its occurrence: D). In this technique, each of the above factors is given a value from 1 to 10, as the higher value indicates the improper effect of the parameters. Finally, the result of multiplying the three mentioned parameters determines the risk rate according to which, risks ranking is done. Regarding the shortcomings of the traditional FMEA approach,

it is combined with Fuzzy logic. This combination is done through the Grey theory (Bobol Amiri, 2010). In the current study, the risks threatening the organizations goals (state) in the time of budget deficit, identification of the risks threatening the Tax Affairs Organization in the time of budget deficit, selection of the most important risks and challenges for the Tax Affairs Organization in the time of budget deficit, and assessment of the most important risks threatening the Tax Affairs Organization using the Fuzzy risk-finding technique (FMEA) are considered.

Methodology

In this applied study with a descriptive-survey approach, the initial data on risk identification and the challenges threatening the Tax Affairs Organization were collected through the library-based study and searching the scientific texts and sources. Afterward, for assessing and finding the root reason of these risks, the data were analyzed using the experts’ ideas and the questionnaires in order to find the most important and critical risks. Then, by the use of FMEA technique, the results were evaluated and finally, through the Fuzzy Grey Theory, the risks were ranked.

Findings

As it was mentioned, the current study aimed at provision of an applied method for identification of the risks threatening the state organizations, especially the Tax Affairs Organization at the time of budget deficit, so after identification of these risks, the fundamental solutions for obviating these risks are provided in order to help improve the budgeting in various status of tax revenues. In this regard, firstly the risks were identified and then, by the use of experts' ideas, the risks were screened in order to choose the related risks. Finally, the chosen risks were ranked by the experts, analytical techniques, and Fuzzy-Grey Theory. The first questionnaire with 10 groups and 93 risks was designed for separation and extraction of factors with a high reliability and distributed to the experts of the field. The results of screening and separation which indicate the main risks were divided to 10 main groups and 66 factors. Finally, according to these results, a questionnaire was designed based on Morgan table and distributed to a 60-person sample of the Tax Affairs Organization experts. Ultimately, the results were analyzed using Excel (conclusion of the main risks item, after analysis of total questionnaires - 66 type risk).

After sorting the table in order of highest to lowest rating, according to Pareto principle (principle of 20 - 80), 20% of the risks with the highest total scores are provided in the table 1.

Table 1: risk factors with the highest scores

No.	Risk factor name	Highest total score
1	Tax evasion	242
2	Bribery	234
3	an immense difference between the income and the expenses of the employees	230
4	Reduction in staff welfare	228
5	Collusion	227
6	Incentives	227
7	Extension of Corruption	226
8	Continuing corruption	225

9	Extortion	223
10	Tolerance towards corruption	221
11	deception	221
12	underestimation of corruption	221
13	interest-seeking approach in people	221
14	relative deprivation of personnel to the community	220

The 14 risk factors provided in table 1 are the most important risks threatening the Tax Affairs Organizations at the time of budget deficit. The prioritization of the risk factors of budget deficit or the RPN is obtained by FMEA. In this stage, the distributed questionnaires using the consultation of the experts, are 20% of the former questionnaires in a way that 14 risk factors obtained from the former question are being asked about for each of the elements as possibility of discovering the risk before occurrence (D), possibility of risk occurrence (P) and severity of the risk after occurrence. Instead of scoring each factor, the Fuzzy verbal variables as very low, low, moderate, high and very high are used for rating. For mathematical calculations of the next steps, the defuzzification of the Fuzzy variables is required. As was mentioned in the methodology, the triangular fuzzy numbers are being used and for converting them into defuzzified numbers, the following equation are used.

Table 2: fuzzy numbers of verbal variables

Verbal variables	Fuzzy numbers
Very low(VL)	(0,0,0.25)
Low(L)	(0,0.25,0.5)
Moderate(M)	(0.25,0.5,0.75)
High(H)	(0.5,0.75,1)
Very High(VH)	(0.75,1,1)

The fuzzy numbers are converted into defuzzified and crisp numbers based on verbal variables and Klien & chen equation (equation 1).

Equation 1
$$K_i = \frac{[b_0 - c] + [b_1 - c]}{\{[b_0 - c] + [b_1 - c]\} - \{[a_0 - d] + [a_1 - d]\}}$$

The defuzzified numbers of each verbal variable are provided in table 3, respectively.

Table 3: Defuzzified numbers of verbal variables

Verbal variables	Defuzzified numbers
Very low(VL)	0/11
Low(L)	0/3
Moderate(M)	0/5
High(H)	0/7
Very High(VH)	0/89

In this stage, after replacing the verbal variables with defuzzified numbers in the parameters survey matrix and calculating the geometric mean of the comments, we obtain the following matrix for every parameter per each risk.

In fact, the risk value never equals to zero, however at best, the lowest possible value can be considered. Based on the equations 3 and 4, the verbal variable value in the current study is 'very low' with the defuzzified value of 0.11 which is taken as the optimal value for parameters possibility and severity of occurrence. For the possibility of discovery, the verbal variable is taken as 'very high' since it indicates that the risk can be discovered at the initial phases and its defuzzified value is 0.11.

Table 6: parameters weighted coefficient

W_d	W_o	W_s
0.295033	0.336229	0.368734

Equation 3 $X_0_{3 \times 14} = \begin{pmatrix} VH & \dots & VL \\ \vdots & \ddots & \vdots \\ VH & \dots & VL \end{pmatrix}$

Equation 4 $X_0_{3 \times 14} = \begin{pmatrix} 0.11 & \dots & 0.11 \\ \vdots & \ddots & \vdots \\ 0.11 & \dots & 0.11 \end{pmatrix}$

The difference matrix, the utility matrix, and the ultimate fuzzy matrix of the risk parameters are calculated by the equations 5 to 6:

$\Delta_j^i = X_0^i - X_j^i$ Equation 5

$D_0 = \begin{pmatrix} \Delta_1^1 & \dots & \Delta_1^3 \\ \vdots & \ddots & \vdots \\ \Delta_{14}^1 & \dots & \Delta_{14}^3 \end{pmatrix}$ Equation 6

Table 7: absolute value matrix of difference between causes matrix and utility matrix

No.	D	O	S
R1	0.557152	0.555302	0.653896
R2	0.490756	0.653896	0.653896
R3	0.381625	0.528652	0.345688
R4	0.384026	0.490756	0.47266
R5	0.152476	0.429769	0.599236
R6	0.504014	0.490756	0.47266
R7	0.414898	0.523084	0.528652
R8	0.389479	0.455109	0.523084
R9	0.280417	0.528652	0.593053
R10	0.360102	0.429769	0.509415
R11	0.374972	0.287316	0.577872
R12	0.485519	0.528652	0.455109
R13	0.397458	0.290143	0.509415
R14	0.436567	0.413509	0.438087

The maximum and minimum of the difference matrix are calculated as 0.653896 and 0.152476, respectively. For calculation of relative coefficient of Grey relation per each element, the equation 7 is used:

$$\gamma_j^i = \frac{\Delta_{min} + \zeta \Delta_{Max}}{\Delta_j^i + \zeta \Delta_{Max}} \quad \text{Equation 7}$$

The matrix of relative coefficient of Grey relation is as equation 10. The final results of Grey relation relative coefficient matrix are shown in table 8.

$$\gamma = \begin{pmatrix} \gamma_1^1 & \dots & \gamma_{14}^3 \\ \vdots & \ddots & \vdots \\ \gamma_{14}^1 & \dots & \gamma_{14}^3 \end{pmatrix} \quad \text{Equation 8}$$

Table 8: Grey relative coefficient matrix

No.	D	O	S
R1	0.5422735	0.5434106	0.4887872
R2	0.5863051	0.4887872	0.4887872
R3	0.676605	0.5603366	0.712754
R4	0.67432	0.5863051	0.5995738
R5	1	0.6335579	0.5176336
R6	0.5769506	0.5863051	0.5995738
R7	0.6462581	0.564007	0.5603366
R8	0.6691875	0.6130295	0.564007
R9	0.7893507	0.5603366	0.5211125
R10	0.6978007	0.6335579	0.5732248
R11	0.683018	0.7804853	0.5298557
R12	0.5900843	0.5603366	0.6130295
R13	0.6618167	0.7769097	0.5732248
R14	0.6279169	0.6474704	0.6266694

The Grey relation degree per each risk is calculated by equation 9:

$$\Gamma_i = w_S \times \gamma_1^i + w_O \times \gamma_2^i + w_D \times \gamma_3^i \quad \text{Equation 9}$$

$i = 1, 2, 3, \dots, 14$

The results of Grey relation degree per each risk are shown in table 9:

Table 9: ultimate matrix of Grey relation degree

No.	Risk factor name	Degree
R1	Continuing corruption	0.71144
R2	Extortion	0.70606
R3	interest-seeking approach in people	0.75676
R4	Collusion	0.76482
R5	Tax evasion	0.87697

No.	Risk factor name	Degree
R6	an immense difference between the income and the expenses of the employees	0.73609
R7	relative deprivation of personnel to the community	0.74904
R8	Extension of Corruption	0.77229
R9	underestimation of corruption	0.79002
R10	Incentives	0.78763
R11	Bribery	0.83267
R12	Tolerance towards corruption	0.73123
R13	Reduction in staff welfare	0.82521
R14	deception	0.77169

The ultimate and precise ranking of the risks threatening the Tax Affairs Organization at the time of budget deficit is provided in table 10:

Table 10: final list of the ranked risks in the order of highest value of grey relation degree to the lowest value

No.	Risk factor name	Degree
1	Tax evasion	0.87697
2	Bribery	0.83267
3	Reduction in staff welfare	0.82521
4	underestimation of corruption	0.79002
5	Incentives	0.78763
6	Extension of Corruption	0.77229
7	deception	0.77169
8	Collusion	0.76482
9	interest-seeking approach in people	0.75676
10	relative deprivation of personnel to the community	0.74904
11	an immense difference between the income and the expenses of the employees	0.73609
12	Tolerance towards corruption	0.73123
13	Continuing corruption	0.71144
14	Extortion	0.70606

Discussion and Conclusion:

In the current study, the identification of the problems and risks of budget deficit in Tax Affairs Organization by the use of fuzzy risk-finding and Grey Theory, was conducted. As it was mentioned before, firstly the risk were identified and then, by the used of experts ideas, they are screened and the related risks were chosen. Finally, the chosen risks were analyzed and ranked based on the experts' ideas, fuzzy analytical techniques, and Grey Theory. According to the results shown in table 12 and figure 2, among the more effective risk creators, the organization internal factors had higher importance than the other factors with 71.4%.

Table 11: more effective groups on risk creation

Name of the group	Importance of group
External factors of Organization	71.4
Internal factors of Organization	14.3
Human resources management	7.2
Individual morality and culture	7.2

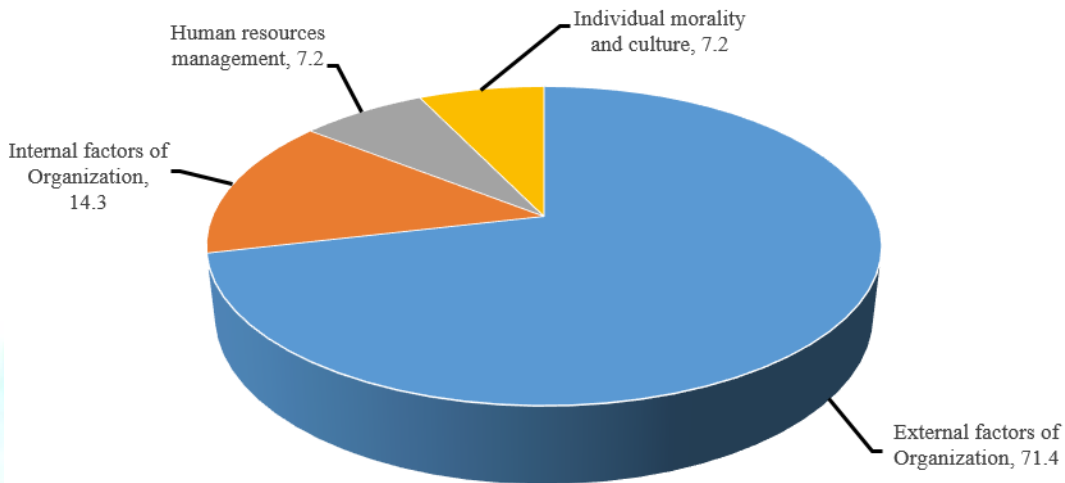


Figure 2: graph of more effective groups on risk creation

The graphs of experts' total scores, the priority number, and Grey relation degree are indicative of the rank of each risk based on their analysis method. The three graphs of possibility of discovery, occurrence, and severity are based on the geometric mean of fuzzy verbal variables of the FMEA technique parameters and the potential effects. Grey relational degree includes all the techniques used in the study. For finding the root reason of the problems creating these risks, consideration for the conditions of each variable is of a great help. Regarding all the obtained results and the studies conducted on more successful countries in terms of tax revenues, the Tax Affairs Organization should be independent in such cases as budget allocation, organizational structure, punishment and reward regulations, and etc. The FMEA and Grey Theory per each of the tax fields such as indirect taxes, added value tax, wealth tax, and ... should be conducted separately, since the mental, spiritual, and psychological conditions are different in these areas. Therefore, the root of the problems in these areas may vary and different choices might be required.

References

1. Bolbol Amiri, N., Asadi Lari, A., (2010), "Iranian Passenger Trains fire risk assessment using fuzzy FMEA-Grey Theory", *Transport Engineering*, 1389.4, 27-37 (in Persian).
2. Deng, J., (1989), "Introduction to Grey System Theory", *The Journal of System*, 1, 1-24.
3. Hadian, E., Ostadzade, A.H., & Safavi, S.A., (2012), "Analyzing the budget deficit behavior of the Iranian government using artificial multilayer neural networks", *Journal of Studies in Applied Economics*, Second Year, 7, 19-40 (in Persian).

4. Hafeznia, M.R., (2005), "Introduction to Research Methods in Human Science", second edition, SAMT publisher, Tehran (in Persian).
5. <http://www.pmi.org/>
6. Kianfar, F, & Najmi, M., & Erahimi, M., (2004), "calculating the degree of FMEA risk priority model using fuzzy theory", the second International Conference on Management (in Persian).
7. Iioni, D., Dulmin, R., Mininno, V., (2012), "Risk assessment in ERP project, Information systems", 37, 183-199
8. Liu, H., Liu, L., Liu, N., MAO, L., (2012), "Risk evaluation in failure mode and effects analysis with extended VIKOR method under fuzzy environment", Expert System With Applications, 39, 12926-12934.
9. Mahjubi, Gh., & Shahbazi, N., (2011), "tax culture in Iran", the monthly magazine of cultural engineering, the fifth year, 55, 56, 55-67 (in Persian).
10. Newman, M.E.J., (2005), "Power laws, Pareto Distributions, and Zipf's law", Contemporary physics, 46(5), 323-351.
11. Olfat, L., Khosravani, F., & Jalali, R., (2010), "Identifying and prioritizing the risks based on the PMBOK project with fuzzy approach (the case of interchange construction projects in bushehr province)", Industrial Management Studies, Issue 19147-163 (in Persian).
12. Pillay, A., Wang, J., (2003), "Modified failure mode and effects analysis using approximate reasoning", Reliability Engineering and system Safety, 79, 69-85.
13. PMI (Project Management Institute) (2008). "A guide to the project management body of knowledge (PMBOK Guide)", Fourth Edition Newton Square, Pennsylvania, U.S.A.
14. Rezaei Nik, E., (2007), "Integrating risk management and project scheduling under uncertainty (case study, power plant)", doctoral thesis, Tarbiat Modarres University (in Persian).
15. Soleimani Ashtiani, M., (2007), "budget and budgeting concepts", Office of Planning and Budgeting Department of Information technology, www.emdad.ir), 1- 16 (in Persian).
16. Taylor, John B. (1998). Economics Second Edition, Houghton Mifflin Company.
17. www.intamedia.ir/
18. Zadeh L.A., 1965, "Fuzzy sets". Information and Control 8, 338-353.
19. Zanjani, V., & Dehghani, A., (2007), "Public finance and fiscal policy of the state", Tehran, Termeh publishing, 1st edition (in Persian).