

Measuring the Efficiency of the Public Spending in Algeria : Evidence from Adrar Medical Sector

Benlaria Mohammed Mostéfaoui Sofiane
 University of Ahmad Draia – Adrar – Algeria

Abstract

The study tends to measure the efficiency of the investment of public spending in the state of Adrar – Algeria. The study concluded that the low efficiency of public investment spending is due to the weakness of investment projects scheduling and the delays in their achievements as well as the magnitude of the deviations between the initial estimates and actual amounts. The study recommends the necessity to determine clearly the projects to be implemented. This determination should be based on the priorities the population needs in an attempt to increase the efficiency of spending and meet the requirements of the individuals.

Keywords: healthcare, medical sector, efficiency, Adrar

1. INTRODUCTION

Public spending is one of the basic tools of financial policy by which the levels of aggregate demand, the growth, the employment and national income are determined. The pattern of distribution is another channel influenced by the behavior of the financial policy. In light of the limited resources available for that spending, it becomes necessary to set up efficiency program of the optimal exploitation of these resources. Although multiple studies that have addressed the task of measuring the efficiency of public spending in many countries of the world, these issues are almost absent in Algeria.

2. THE EFFICIENCY OF PUBLIC SPENDING

The efficiency analysis is based on the study of the relationship between the inputs and outputs (B. Wilson, 1982; T. V. S. Ramamohan Rao, 1989; Tim Coelli, 1998; Harold O. Fried *et al*, 1993; Timothy J. Coelli *et al*, 2005; Rolf Fare *et al*, 2007; Yangseon Yim, 2008). Hence, it is different from the concept of performance which focuses on studying and analyzing the output side only without paying attention to the input side (Jerry R. Green, 1975; Allan Warmington *et al*, 1977; Kathy Hayes, 2000; Robert Carton, 2006)

In this context, efficiency aimed at achieving the optimum utilization of inputs or resources by maximizing the outputs resulting from the use of a certain amount of these inputs, or reducing the inputs needed to get a certain amount of that output (Ivor H. Seeley, 1976; William F. Glueck, 1976; John H. Boyd, 1988; Paul Keys, 1991; Jens Becker, 2002; Robert L. Schalock *et al*, 2016;)

The same applies to the analysis of the efficiency of public spending. The outputs represented by the form of public spending are exploited to get different outputs by which the government is seeking to achieve the development targets (J.W. M. Eddy, 1931; Gerhard Colm, 1936; Maurice Kogan, 1976; Rudolf Klein, 1976). In addition to this, the efficiency of public spending is determined by the ratio of inputs relative to outputs. Whenever the proportion of outputs is bigger relatively to inputs, the level of the efficiency is high and vice versa (Wylie Kilpatrick, 1936; Paul A. Samuelson, 1954; Jurgen G. Backhaus, 2005)

3. MEASUREMENT APPROACHES OF THE PUBLIC SPENDING EFFICIENCY:

The process of measuring public spending efficiency is a complex process. This is due to the diversity of public spending targets at one hand, and the difficulty to sell the government sector outputs via the market at the other hand (John Biffen, 1980; R. G. Bevan, 1980;). Additionally, the lack of price data for those outputs and the difficulty of determining their amount is another issue that complicates the measurement process of the efficiency (Martin Feldstein, 1973). At another angle of analysis, the difficulty of isolating and separating the influence of external factors, affects the efficiency of public spending (Harold Copeman, 1981; Cedric Sandford, 1983; Raghendra Jha, 1995)

Many studies have attempted to measure the efficiency of public spending through the analysis of the impact of public spending on a range of social and economic indicators (James M. Buchanan, 1999; Robert Holzmann, 1990; Stephan Brehm, 2013; Valerio Ecolani, 2014; Hafedh; Bouakez, 2015; Giorgio D'Agostino *et al*, 2016; Yazid Dissou, 2016). In this field, some studies adopted the index of Public Sector Performance (PSP) to compute the Public Spending Efficiency (PSE) (Antonio Afonso *et al*, 2003; Teresa Curristine, 2007; Konstantinos Angelopoulos *et al*, 2008; Cai Zhonghua, 2012; Bogdan-Gabriel Zugravu, 2012; G.J. van Helden, 2013; Charalampos Amygdalos, 2014; Roland F. Speklé, 2014; Ingrida Balaboniene, 2015)

In this sense, the computation of the index of Public Sector Performance (PSP) is based on a range of sub-indices of economic and social contexts in which the public spending exercises an evident influence. These sub-indices in their own right are divided into two main groups; the first group includes the Opportunity

Indicators while the second group is interested by three areas, namely: the justice of distribution, the stability and the economic performance (Ouchi, W. G, 1979; Lars-Erik Borge, 2008; Sandeep Kumar Mogha, 2015; Natalia Cuguero'-Escofet, 2016;).

The Opportunity Indicators figure out the performance in four basic sectors:

Public administration sector in which the indicator computation is based on the following performance indicators: corruption, bureaucracy, the quality of the judicial system, and the shadow economy (Marco De Marco, 2013).

The education sector: the performance of this sector is measured by the index ratio of enrollment in secondary education and the OECD indicators which gauge the extent of accomplishment achieved in the field of education (Educational Achievement). The latter presents a picture of both the quality and the availability of the education (J. Ruggiero, 2004; Wulong Gu, 2015)

The health sector: the performance of this sector is based on the rate of child mortality and the index of life expectancy at birth (Julian LeGrand, 1978; Blossom Y. J. Lin, 1999; Abu Sadat Nurullah et al, 2014)

The infrastructure sector: the performance of this sector depends on the quality of infrastructure, communications and transport sector index (Bert Hof et al, 2011; Yamur K. Al-Douri et al, 2016)

The second set of indicators and includes the following:

The justice of income distribution: this is measured by the share of 40% poorer population as a percentage from the income

The economic stability as measured by the stability of the GDP growth rate

Thus, the performance of each sector or area (PSP) mentioned above depends on a range of sub-indices; so that the improvement in the development of sub-indices as a result of increased government spending would be reflected positively on the performance of the sector index or the area under study. In this context, the index performance of each sector is computed by the average of all the sub-indices of the entire sector.

Indeed, the performance efficiency of each sector is computed by adopting the indicator of the

Performance Sector Efficiency (PSE_{ij}). The latter is given by the relative performance ratio of each sector (PSP_{ij}) to the public spending of the sector (PEX_{ij}). Technically:

$$PSE_{ij} = \frac{PSP_{ij}}{PEX_{ij}}$$

Accordingly, the performance of the public administration sector is attributed to public spending on procurement of goods and services while the performance of both the health and education sector is attributed to what is allocated to spend on each. In addition, the performance in the infrastructure sector is figured out by the investment spending and the performance of the distribution income justice is measured by the size of transfers. The last performance which is about stability and economic performance is attributed to the total public expenditure (Cai Zhonghua, 2012)

4. FACTORS OF PERFORMANCE AND PUBLIC SPENDING EFFICIENCY

The factors that conduct the performance and the efficiency of the public spending are diverse. This diversity comes from the multiplicity of the influence context (economic, social, political, institutional...) and the way of how each context influences the performance extent. These factors are the following:

4.1. PUBLIC SPENDING TO THE GROSS DOMESTIC PRODUCT

This ratio measures the government performance and efficiency in public spending. In this context, many studies concluded that governments of small magnitude in which the public spending does not exceed 40% of the gross domestic product represent a high level of efficiency and vice versa (Cedric Sandford, 1984)

However, this suggestion is not taken for granted as many countries had exceeded the public spending level mentioned above and showed a high level of performance and efficiency (Germany 45%, Spain 45%, United States 43.6%, Great Britain 48.5%, France 56%, and Sweden 51.2%). The issue here is not based only on the relative consideration between public spending and GDP but it is related to the efficiency of the spending allocation, the range of policies and procedures applied and the rigorous treatment to fight corruption.

4.2. PATTERN OF SPENDING ALLOCATION TO SUB-SECTORS

Most of the studies agreed that the pattern of allocation of spending to the various sub-sectors affect significantly the efficiency levels. The proposition means that the way of how the public spending is allocated would affect the level of the efficiency of that spending without modifying its size.

4.3. GOVERNANCE, CORRUPTION AND THE DEGREE OF CONTROL OVER THE GOVERNMENT'S PERFORMANCE

Some studies concluded that there is a positive relationship between the levels of good governance achieved by the state the performance of public spending. The reason behind this is that the improved governance levels lead to an improved performance and efficiency of the public administration sector, which is reflected at the end in the performance and efficiency of the government sector as a whole

4.4. SOURCES OF PUBLIC SPENDING:

Some studies have found that the countries with high dependence on foreign aid to finance public spending represent generally a low level of public spending efficiency, compared to those that rely more on increasing the tax burden to consolidate the financing sources. The reason of this for this is the lack of the motivation to exploit efficiently and rationally those resources coming from abroad.

Accordingly, citizens who bear the higher rates of tax are demanding their governments to provide better services and to search for the best ways to increase the efficiency of public spending. The same case is shown when the tax base broadens as the number of citizens who are monitoring the government's performance increases.

4.5. POLITICAL STABILITY AND THE LEVEL OF CIVIL LIBERTIES:

This issue consolidates the political stability which is of a big importance to increase the efficiency of public spending. This stability ensures the low levels of the expected risks, the fact that contributes positively in increasing the diversity of the economy, the justice of the income distribution and the rationality of the resources allocation.

5. PERFORMANCE AND EFFICIENCY OF PUBLIC INVESTMENT SPENDING IN ALGERIA – STATE OF ADRAR AS AN EMPIRICAL STUDY-

This study adopts a new methodology to measure the performance and efficiency of public investment spending in the medical sector of Adrar state- Algeria for the year 2015. This approach is based on a set of indicators that will be used in the survey to monitor and expect public spending as viable indicators in different periods. The indicators are used to compare the performance and the efficiency levels in the country in which the number of the sectors included in the study can be increased in order to give a comprehensive picture of the issue investigated

In this context, it should be noted that good performance indicators must fulfill some conditions or basic characteristics that most of the studies have agreed to call them by the acronym "**CREAM**". The five capital letters of this acronym means respectively:

- Clarity**: the performance indicators must enjoy the clarity, the precision and the lack of ambiguity;
- Relevance**: the performance indicators must have a direct and clear association with the outputs aimed to achieve
- Economic**: the expected return of the performance indicators must exceed the cost of collecting and analyzing the data of the study
- Adequate**: the indicator should cover the requirements to evaluate the performance of the sector under study
- Monitorable**: the indicator should accept monitoring and screening over different periods in an attempt to make the useful comparison of the efficiency progress or decline.

6. RESEARCH METHODOLOGY:

The study sample is selected according to the following criteria: the population density of the district or the state under study, the medical institution as well as health infrastructures.

6.1. THE PERFORMANCE MEASUREMENT OF THE MEDICAL SECTOR OF ADRAR STATE FOR THE YEAR 2015

- MEASURING INPUTS

The following table shows the infrastructure realized for 2015

Table 1: The realized infrastructure for the year 2015

Inputs Installation	Hospitals	Equipment	Applied formations And trainings	Medical Staffs	Expansion of tests' offices	Rehabilitations
Adrar	Hospital of 120 beds for older people	56 devices for sterilization	861 trainings for various fields	12 staffs	16 offices	- Rehabilitation of the emergency services by 5 million dinars - Rehabilitation of the hospitals' kitchens by an amount of 7 million dinars - Rehabilitation of the child birth service by an amount of 44 million dinars -Restoration and the rehabilitation of the multi-service clinics by an amount of 12 million dinars
Aoulef	Hospital of 60 beds					

Source: The result of the activities presented to the governor of Adrar by the secretariat of the state

The above table shows the structures and as well as the configuration and equipment of the medical sector of Adrar state for the year 2015. This sector had benefited from two hospitals, a hospital with a capacity of 120 for aging people and another hospital with a capacity of 60 beds in Aoulef. In addition to this, the sector enjoyed a number of important devices amounted to 56 sterilization devices and 12 medical staffs. About training and apprenticeship, the medical sector presented a program of 861 training sessions for different branches. These contributions may improve the performance and the efficiency of presenting the healthcare service in this state.

Table 2: Investment expenditures allocated to the medical sector for the year 2015

Statement	Year
	2015
The total investment expenditures of the state	5.751.996.000 DZD
The investment expenditures for the medical sector of Adrar state	370.000.000 DZD
Number of beds of the state hospitals	786 beds
Population of the Municipality of Adrar	77910 persons
Population of the Municipality of Timimoun	40375
Population of the Municipality of Aoulef	25679
The amount of the recycled projects	250.000.000 DZD
The share of total health spending from the investment spending of the state (%)	6.43 %
Per capita investment spending in the municipalities of the state	2.570
The proportion of the number of beds to the population of the state municipalities	0.00546 bed
The proportion of the number of beds of Adrar municipality to the municipality residents	0.00424 bed
The proportion of the number of beds of Timimoun municipality to the municipality residents	0.003 bed
he proportion of the number of beds of Aoulef municipality to the municipality residents	0.00234 bed

Source: The result of the activities presented to the governor of Adrar by the secretariat of the state

The above table shows that the different proportions of the investment expenditures for the medical sector of Adrar state. According to the table, it represents 6.43% of the total spending of the investment which is minimal compared to other sectors such as education, higher education. The share does not reflect the importance that should be enjoyed by the medical sector, especially with the basic responsibility assumed by this sector which is the presentation of the health services to the population.

What raises the attention also is the amount of the recycled projects: 250,000,000 DZD representing

68% of the investment spending for the year 2015. This shows clearly the weakness of the preliminary studies of the projects, and the weakness of control in the implementation. This fact leads to the high cost of projects as a result of prices variation of the goods and services used in the completion of the delayed projects.

6.2. MEASUREMENT OF THE HEALTH SECTOR OPERATIONS:

Table 3: inspections of the Department of Internal Audit

Sector	Institution	Number of visits	The procedures applied
Public sector	Public health institutions	28	Addressing written alerts to improve some deficiencies and imperfections
	Agglomeration Institutions of healthcare	36	Addressing considerable sanctions to the negligent and careless people in assuming their responsibilities
Private sector	Private pharmacies	22	Addressing warnings and sanctions to the pharmacies for not respecting dates of permanent presence
	Special clinics institutions	16	Provisional arrest of the private medical for not respecting the applicable law of succession
	Dental surgery clinics	05	Contact the practitioners to present the recorded deficiencies

Source: The result of the activities presented to the governor of Adrar by the secretariat of the state

The above table shows the audits undergone by the institutions of the medical sector in Adrar which amounted to 107 shared between the public institutions (64) and private sector (43). The results of the audit practices are the package of alerts and warnings as well as the arrest of one of the private clinics for non-respect of succession applicable laws.

Table 4: Surgical operations performed during 2015

Health institutions			Total
Adrar	Timimoun	Aoulef	
1839	1507	00	3346

Source: The result of the activities presented to the governor of Adrar by the secretariat of the state

Through the above table it is clear that the municipality of Adrar shows the largest number of surgical operations performed (1839), this record is followed by Timimoun (1507). However, Aoulef does not reveal any surgical operation. This is due to the delay of the hospital comprising 60 beds to start working.

Table 5: laboratory analyses

Health institutions			Total
Adrar	Timimoun	Aoulef	
188524	140687	00	329211

Source: The result of the activities presented to the governor of Adrar by the secretariat of the state

The table presents the number of the laboratory analysis activities. It shows the highest number in the municipality of Adrar by a number of 188,524, this is followed by the Municipality of Timimoun by a number of 140687. The highest number of the laboratory analyses in Adrar compared with Timimoun and Aoulef is due to the big number of patients and the availability of a considerable package of equipment and doctors.

THE OUTPUT SCALE:

Table 7: the state of the health sector output for the year 2015

Public Health Institutions	Number of beds	Number of the resident patients	Number of hospitalization days	The proportion of the beds utilization (%)	Rate of hospital residency	Patient cost per day
Adrar	330	9090	53384	75	06	1200 DZD
Timimoun	135	5022	42598	73	08	1200 DZD

Source: The result of the health sector activities presented to the governor of Adrar and the secretariat of the state

The records of the table show the domination of the municipality of Adrar in terms of beds' number, days of residency in hospitals, the hospitalization days, and the utilization of the beds as well as the rate of the hospital residency. The patient cost per day is the same in both Adrar and Timimoun. The high level of the cost is due to the low quality of the services presented to the patients and the absence of the specialist doctors.

MEASURING RESULTS:

Table 9: The diseases recorded in Adrar state for the years 2013, 2014, 2015

Disease	2013	2014	2015
Dysentery	00	00	00
Typhoid Fever	04	00	00
Viral Hepatitis (A)	00	07	50
Viral Hepatitis (B)	82	103	125
Viral Hepatitis (C)	05	02	10
Ague	56	26	70
Tuberculosis	97	49	64
Meningitis	20	11	15
Gonococcal urethritis	05	02	01
Measles	337	07	72
Syphilis	101	92	103
Diphtheria	00	00	01
Trachoma	3700	714	719
Food Poisonings	126	172	13
Pertussis	02	06	02
Leishmania	19	11	6
Brucellosis	00	02	00
HIV infection	29	21	16

Source: The result of the health sector activities presented to the governor of Adrar and the secretariat of the state

Despite the efforts and the consolidations addressed to strengthen the medical sector of Adrar, some diseases are still persisting, for example: Viral Hepatitis by its different forms (A, B, C), Syphilis and Ague. Some other diseases show a decreasing level as Trachoma, Tuberculosis and Leishmania but it is still insufficient as a result of the lack of medical supplies and the diagnosis to determine the disease.

7. CONCLUSION:

This paper gives a picture of the health sector in the state of Adrar –Algeria. The situation of the sector is still in a lack. According to the analysis, this fact is due to the following points:

- The absence of a concrete vision to develop the sector.
- The lack of the skilled practitioners and the doctors as well as the develop diagnosis to determine the disease.
- The insufficiency in the necessary medical equipment.

In light of this, the researchers present the following recommendations:

- The projects specification should be based on the population priorities in order to rise the efficiency spending and meet the requirements of the basic needs of the population. This target is achieved only by following the result-budget methodology.
- The reduction of the deviations between the initial estimates of the projects and the real amounts. This approach can be possible by increasing the quality of the projects and stimulating the internal and external audit processes (the population control). The aim of this is to raise the spending efficiency.
- Reducing the number of the patients hospitalization by improving the quality of the services provided by doctors and specialists.

REFERENCES

- Abu Sadat Nurullah, Herbert C Northcott & Michael D Harvey. 2014, Public assessment of key performance indicators of healthcare in a Canadian province: the effect of age and chronic health problems, *Springer Plus*, 1-13
- Allan Warmington, Tom Lupton & Cecily Gribbin. 1977, *Organizational Behavior and Performance: An Open System Approach to Change*, The Macmillan Press LTD
- Antonio Afonso, Ludger Schuknecht & Vito Tanzi. 2003, Public Sector Efficiency: an International Comparison, *Working paper Series, European Central Bank* 242: 1-37
- B. Wilson, C. C. Berg and D. French, 1982, *Efficiency of Manufacturing Systems*, Published in Cooperation with NATO Scientific Affairs Division
- Bert Hof, Arjan Heyma & Toon van der Hoorn. 2011, Comparing the performance of models for wider economic benefits of transport infrastructure: results of a Dutch case study, *Transportation*: 1-18
- Blossom Y. J. Lin & Thomas T. H. Wan. 1999, Analysis of Integrated Healthcare Networks' Performance: A

- Contingency-Strategic Management Perspective, *Journal of Medical Systems* 23(6): 467-485
- Bogdan-Gabriel Zugravu & Anca- Stefania Sava. 2012, Recent Changes in Public Sector Efficiency in Romania: Determinants and Implications, *Procedia - Social and Behavioral Sciences* 58: 423-433
- Cai Zhonghua & Wang Ye. 2012, Research Frontiers in Public Sector Performance Measurement, *Physics Procedia* 25: 793-799
- Cedric Sandford. 1984, *Economics of Public Finance*, Pergamon Press
- Charalampos Amygdalos, Nikoleta Bara, Georgios Moisiadis. 2014, Performance Appraisal in Greek Public Sector, *Procedia - Social and Behavioral Sciences* 148: 501-506
- Daniel P. Murphy. 2015, How can government spending stimulate consumption, *Review of Economic Dynamics* 18: 551-574
- G.J. van Helden & C. Reichard. 2013, A meta-review of public sector performance management research, *Review of Applied Management Studies* 11: 10-20
- Gerhard Colm. 1936, Theory of Public Expenditures, *The Annals of the American Academy of Political and Social Science* 183: 1-11
- Giorgio D'Agostino, J. Paul Dune & Luca Pieroni. 2016, Government Spending, Corruption and Economic Growth, *World Development* 84: 190-205
- Hafedh Bouakez & Aurelien Eyquem. 2015, Government spending, monetary policy, and the real exchange rate, *Journal of International Money and Finance* 56: 178-201
- Harold Copeman. 1981, Analyzing Public Expenditure: (1) Planning, Control and Price, *Journal of Public Policy* 1(3): 289-306
- Harold O. Fried, C. A. Knox Lovell, Shelton S. Schmidt. 1993, *The Measurement of Productive Efficiency: Techniques and Applications*, Oxford University Press, Inc
- Ingrida Balaboniene, Giedre Vecerskiene. 2015, The Aspects of Performance in Public Sector Organization, *Procedia-Social and Behavioral Sciences* 213: 314-320
- Ivor H. Seeley. 1976, *Building Economics*, Second Edition, The Macmillan Press LTD
- J. Ruggiero, Performance evaluation in education, Dayton, Ohio: *University of Dayton Press*, 2004, pp. 323-348.
- J.W. M. Eddy. 1931, Public Expenditure, *The Annals of the American Academy of Political and Social Science* 158: 202-210
- James M. Buchanan & Richard A. Musgrave. 1999, *Public Finance and Public Choice: Two contrasting visions of the state*, MIT Press
- Jens Becker. 2002, *Beyond the Market: The Social Foundation of Economic Efficiency*, Princeton University Press
- Jerry R. Green & Eytan Sheshinski. 1975, A Note on the Progressivity of Optimal Public Expenditures, *The Quarterly Journal of Economics* 89 (1): 138-144
- John Biffen. 1980, Management and Control of Public Expenditure: An Address, *The Journal of the Operational Research Society* 31(12): 1059-1061
- John H. Boyd, Edward C. Prescott & Bruce D. Smith. 1988, Organizations in Economic Analysis, *The Canadian Journal of Economics* 21(3): 477-491
- Julian LeGrand. 1978, The Distribution of Public Expenditure: *The Case of Health Care, Economica, New Series* 45(178): 125-142
- Jurgen G. Backhaus & Richard E. Wagner. 2005, *Handbook of Public Finance*, Kluwer Academic Publishers
- Kathy Hayes. 2000, Public Sector Performance: Move or Monitor? *Southern Economic Journal* 66(4): 820-828
- Konstantinos Angelopoulos, Apostolis Philippopoulos & Efthymios Tsionas. 2008, Does public sector efficiency matter? Revisiting the relation between fiscal size and economic growth in a world sample, *Working Paper* 1-33
- Lars-Erik Borge, Torberg Falch & Per Tovmo. 2008, Public sector efficiency: the roles of political and budgetary institutions, fiscal capacity, and democratic participation, *Public Choice* 136: 475-495
- Marco De Marco & Paolo Spagnoletti. 2013, *Designing Organizational Systems*, Springer
- Martin Feldstein & Harold Luft. 1973, Distributional Constraints in Public Expenditure Planning, *Management Science* 19(12): 1414-1422
- Maurice Kogan. 1976, The Politics of Public Expenditure' by Rudolf Klein: A Comment, *British Journal of Political Science* 6(4): 507-508
- Natalia Cuguero'-Escofet & Josep M. Rosanas. 2016, The Ethics of Metrics: Overcoming the Dysfunctional Effects of Performance Measurements Through Justice, *J Bus Ethics*: 1-17
- Ouchi, W. G. (1979). A conceptual framework for the design of organizational control mechanisms. *Management Science*, 25(9): 833-848.
- Paul A. Samuelson. 1954, The Pure Theory of Public Expenditure, *The Review of Economics and Statistics* 36(4): 387-389

- Paul Keys. 1991, Operational Research in Organizations: A Metaphorical Analysis, *The Journal of the Operational Research Society* 42(6): 435-446
- R. G. Bevan. 1980, O.R. and Public Expenditure Planning and Control, *The Journal of the Operational Research Society* 31(3): 201-208
- Raghubendra Jha. 1995, True Cost of Public Expenditure, *Economic and Political Weekly* 30(46): 2935-2936
- Ramamohan Rao. 1989, *Economic Efficiency of the Organizational Decisions of the Firm*, Springer-Verlag Berlin
- Robert B. Carton & Charles W. Hofer. 2006, *Measuring Organizational Performance: Metrics for Entrepreneurship and Strategic Management Research*, Edward Elgar
- Robert Holzmann. 1990, The Welfare Effects of Public Expenditure programs Reconsidered, *Staff Papers (International Monetary Fund)*, 37(2): 338-359
- Robert L. Schalock, Miguel Verdugo & Tim Lee. 2016, A systematic approach to an organization's sustainability, *Evaluation and Program Planning* 56: 56-63
- Rolf Fare, Shawna Grosskopf, Daniel Primont. 2007, *Aggregation, Efficiency and Measurement*, Springer
- Rudolf Klein. 1976, The Politics of Public Expenditure: American Theory and British Practice, *British Journal of Political Science* 6(4): 401-432
- Roland F. Speklé & Frank H.M. Verbeeten. 2014, The Use of Performance Measurement Systems in the Public Sector: Effects on Performance, *Management Accounting Research* 25: 131-146
- Sandeep Kumar Mogha, Shiv Prasad Yadav & S. P. Singh. 2015, Technical Efficiency and Productivity Growth in Public Sector Hospitals of Uttarakhand (India), *Int J Syst Assur Eng Manag* 6(4): 390-406
- Stephen Brehm. 2013, Fiscal Incentives, Public Spending, and Productivity: Country Level Evidence from Chinese Province, *World Development* 46: 92-103
- Teresa Curristine, Zsuzsanna Lonti & Isabelle Joumard. 2007, Improving Public Sector Efficiency: Challenges and Opportunities, *OECD Journal of Budgeting* 7(1): 1-41
- Tim Coelli, D. S. Prasado Rao, George E. Battese. 1998, *An Introduction to Efficiency and Productivity Analysis*, Kluwer Academic Publisher
- Timothy J. Coelli, D. S. Prasada Rao, Christopher J. O'Donnell and Geroge E. Battese. 2005, *An Introduction to Efficiency and Productivity Analysis*, second edition, Springer Science
- Valerio Ercolani & João Valle e Azevedo. 2014, The effects of public spending externalities, *Journal of Economic Dynamics & Control* 46: 173-199
- William F. Glueck. 1976, Applied Organization Analysis, *The Academy of Management Journal* 10(3), 223-234
- Wulong Gu & Ambrose Wong. 2015, Productivity and Economic Output of the Education Sector, *J Prod Anal* 43: 165-182
- Wylie Kilpatrick. 1936, Classification and Measurement of Public Expenditures, *The Annals of the American Academy of Political and Social Science* 183: 19-26
- Yangseon Yim & Peter Schmidt. 2008, Marginal Comparisons with the Best and the Efficiency Measurement Problem, *Journal of Business & Economic Statistics* 26(2): 253-260
- Yamur K. Al-Douri, Phillip Tretten & Ramin Karim. 2016, Improvement of Railway Performance: a Study of Swedish Railway Infrastructure, *J. Mod. Transport* 24(1): 22-37
- Yazid Dissou, Selma Didic & Tatsiana Yakautsava. 2016, Government spending on education, human capital accumulation, and growth, *Economic Modelling* 58: 9-21