Using Capital Budget and Sensitivity Analysis to Predict Future Cash Flows and Evaluate Investment Projects: Empirical Study at Iraqi Company for Production, Marketing and Meat and Field Crops

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Abstract: The research aims to study the variables that have not been studied by previous researchers in the field of cost accounting to the extent of the researcher's knowledge. The objective of the research was to use the capital budget and sensitivity analysis to determine the inflows and outflows of cash and the sensitivity of each element and to indicate their role in making the decision to choose the project for the best investment. The researchers choose Iraqi company for the production and marketing of meat and field crops which included research study four investment projects namely the Abu Ghraib Poultry Investment Project, Al-Dora Poultry investment project, Al-Karkh Poultry investment project and Al-Ghalbiyah Poultry investment. The researchers reached a set of conclusions, the most important of which is the balance of capital and sensitivity analysis have role in providing accurate information to help the decision makers to take the best investment decision through the differentiation between investment projects and evaluation, the researchers have recommended a set of recommendations, the most important of which is the need to choose criteria for the evaluation of investment projects based on scientific bases which allow the decision maker to choose between investment projects.

Key words: Capital budget, sensitivity analysis, variables, evaluation, projects, decision

INTRODUCTION

The word budget is derived from French word "bougeotte" as the word is introduced on the state prepared statement to estimate the country's expenses and revenues. All countries of the world consider the preparation of budgets as high priorities in both political and economic systems (Flayyih, 2016). The analysis of budget targets has been one of the first and most interesting areas of behavioral accounting research. According to Kihn (2011), the management's expectations of selected financial and non-financial elements such as financial position, head count, future income, units manufactured and a number of newly introduced products are quantified by the budget targets. In addition, the companies started using budgets in the 1960s to enforce what people need to do. Performance improvement was based on meeting financial targets in the 1970s rather than effectiveness.

The advent of industrial capitalism came along with budgeting in business organization due to the industrial revolution of the eighteen century that led to challenge for industrial management. Olurankinse (2011) stated that the emphasis and emergence of scientific management philosophy on detailed information as a basis for making decision provided a tremendous momentum for budgeting techniques and development of management accounting. One of the key issues in corporate finance is capital budgeting over a long time and important theoretical developments have been integrated into the processes of capital intensive companies (Viviers and Cohen, 2011). In other word, the word capital budgeting is applied to describe how managers plan significant investments in projects with long-term impacts like introduction of new products or purchase of new equipment.

The problem of research that the economic units, including the mentioned research is not depend on the scientific methods of administrative accounting to predict

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the future eternal and external cash flows of investment projects and then evaluate these projects to know the best according to the results of scientific study and the adoption of the assessment or personal judgment when evaluating investment projects. The use of the capital budget and sensitivity analysis to determine the eternal and external cash flows and the sensitivity of each element and to indicate their role in making the decision to choose the project for the best investment. The research derives its importance through the following: Focus on the decision to choose the best investment project through the use of the capital budget and sensitivity analysis. The importance of the process of evaluation of investment projects in accordance with the scientific management accounting rather than relying on personal judgment. The research is based on the hypothesis that the scientific methods of administrative accounting (capital budgeting and sensitivity analysis) lead to making right investment decisions by evaluating and selecting the best investment projects.

Theoretical framework
Concept of capital budget: The majority of the companies have potential projects that are fundable. Thus, managers must carefully do selection of those projects that yield greatest return in the future. In the long-run of the financial health of the organization how well managers make these capital budgeting decisions is a critical factor (Garrison *et al.*, 2010). The decisions related to capital budgeting has been a critical issue in the sustainability of the company. Due to wrong decision on capital budgeting, several companies have lost their identity or entered liquidation at one time or the other. Therefore it is important to use effective method to analyze investment before decision is made considering the effect of globalization on industries and the prevalent problems in industries. Also, capital budgeting is highly important as making decision involves opportunity and direction for future growth of the organization (Awomewe and Ogundele, 2008).

Sensitivity analysis: When an underlying assumption changes or the original predicted data are not achieved, sensitivity analysis is a "what-if" technique managers use to examine how an outcome will change. The managers feel, so, good when they have an idea on sensitivity analysis. It is also considered to be simple approach for recognizing uncertainty a possibility that an actual amount will deviate from an expected amount. (Horngren, 1972) defined sensitivity analysis as the process of determining the level of change that occurs in a variable prior to making another decision. Sensitivity

analysis can be conducted for project life, annual net cash flows and discount rate in a capital budgeting situation. All information used in capital budgeting are evaluated except for the initial purchase price.

Indulging in estimation provides possibility of finding error and sensitivity analysis identifies an error range for different values which the project can still be acceptable. Furthermore, there is relationship between sensitivity analysis and discount rate, cash flows and asset life. In addition (Kinney and Raiborn, 2012) claimed that sensitivity is one of the approaches to cope with changes in variable values. Sensitivity analysis deals with how findings can be changed if the actual estimate or underpinning assumptions change (Drury, 2013). Sensitivity analysis is a common technique for addressing the impact of uncertainty. Moreover, if a key prediction or assumption proved to be wrong, sensitivity analysis is a technique for determining what will happen next. It can also help the management of accounting to decide which parameter is more critical in the analysis to accurately estimate (Hilton and Platt, 2014).

Literature review: For an effective result, a capital budgeting should concentrate on getting high quality cash flow information of projects in the study of (Artikis, 1999). The study concluded that getting high quality cash flow information of projects should be the area of concentration in capital budgeting and due to the prevailing economic conditions, the capital budgeting process is an exclusive area. The area is probably one of the sensitive aspects in financing. The study of Lynch (2002) affirmed that the capital budgeting process for fixed assets can be improved while other can be implemented by sensitivity analysis.

Furthermore, the study of Correia and Cramer (2008) employed a sample survey to analyze and determine the corporate finance practices of listed companies in South African in relation to capital budgeting decisions, capital structure and cost of capital. The results from the survey confirmed the authenticity of the financial theory and are generally in consistency with a quiet number of studies. This study found that companies always employ DCF methods such as IRR and NPV to evaluate projects. CAPM are always used by the companies to determine the cost of equity and most of the companies use either flexible or strict target debt-equity ratio. Notably, most of the practices by the South African corporate sector are in accordance with the practices employed by the US companies. The relatively high developed state of the South African economy misrepresents its status as an emerging market. Nevertheless, the result has revealed many ideas that indicate gaps in the application of finance

theory. New developments like the Real options, APV, EVA and Monte Carlo Simulation have not been satisfactorily explored.

In similar way, the South African companies showed low target debt-equity ratios as a reflection of exceptionally low use of debt. In the study of Khamees *et al.* (2010), additional empirical evidences are provided on budgeting practices in an emerging economy. Survey questionnaires and interview are used to collect data from the respondents. The result revealed that in evaluating capital investment projects, the JIC almost give the same importance to the discounted and undiscounted cash flow methods. It is notable that the profitability index followed by the payback period is the most frequent used technique. Also, Bennouna *et al.* (2010) evaluated the current techniques in capital budget decision making in Canada including separation of real options towards continuity of sophisticated techniques. However, in large firms, 17% did not use Discounted Cash Flow (DCF). From those who used DCF the majority favoured Internal Rate of Return (IRR) and Net Present Value (NPV). In general, one in ten or in three was not correctly applying certain aspects of DCF only 8% used the real options.

Viviers and Cohen (2011) investigated the capital budgeting practices of a sample in motor manufacturing companies in South Africa. The study compared the empirical findings with the existing ones in order to establish whether the theoretical aspects are still widely implemented. The two most popular appraisal methods used in practice are internal rate of return and Net Present Value (NPV). Before making substantial capital investments, most of the respondents used multiple criteria. The result of the study vindicated the theory of contemporary capital budgeting. Similarly, the study of Shastri *et al.* (2011) investigated the upper-level accounting of finance students, Discounted Cash Flow (DCF) capital budgeting decision models, intricacies of option pricing how risk analysis of long-term capital investments can be facilitated by explicit consideration of real options, the role of sensitivity analysis in the capital investment projects with real options and various types of real options. The findings showed that there are two are two primary conceptual lessons that students realized by completing this educational case. The real options analysis is a robust and conceptually correct way to specially analyze the project uncertainty and failure to consider these real options in the analysis of capital investment projects will result to substandard decision-making.

Singh *et al.* (2012) investigated the current capital budgeting in Indian companies and provided a normative model for practitioners. The findings of the study are in line with capital budgeting decisions and sophisticated techniques as used in India. The selected firms in this study used both Discounted Cash Flow (DCF) techniques and non-DCF techniques together. More than three quarters of the selected companies used Internal Rate of Return (IRR) while half of the sample companies favoured over Net Present Value (NPV). Half of the sample companies used real options. Fixed assets (net) and working capital (net) are financed by permanent (long-term) capital. In order to calculate the SIP cash flows and the values of its interim capitals, Bosch-Badia *et al.* (2014) developed a model following the Average Internal Rate of Return (AIRR) paradigm. The final value of the shareholders depends on two reinvestment rates that capture the returns obtained by the dividends and retained cash flows reinvested by shareholders respectively. On this basis, this study employed the idea of value creation analysis by combining both reinvestments rates in the Shareholder's Net Present Value (SNPV). The AIRR of the SIP and a variant of it can be easily obtained with the use of the model, external reinvestment on the shareholder's final value and the equity growth rate that embeds the impact of internal reinvestment.

In another study Li *et al.* (2015) examined the capital budget problem in uncertain environment where annual net cash flows of available projects and investment outlays are given subject to expert's estimations. Due to extension of Net Present Value (NPV) to uncertain environment, three mathematical models are constructed for the problem: chance-measure programming model, expected value model and chance-constrained programming model. Then, some equivalenceis discussed for the different models. Additionally, the study presents a hybrid intelligent algorithm for solving the proposed models in general cases. Also, some numerical examples are provided to illustrate the modeling idea and the effectiveness of the proposed algorithm.

MATERIALS AND METHODS

Data and method

Current value net: Table 1 clarified the calculation of current value net that resulted from the difference between the current value of cash for mentioned projects (input cash flows) and investment cost (output cash flow). Abu-Ghraib Poultry investment project achieved positive value amounted (15210000 I.D), so, the project accepted and preferably to earn revenue as well as Al-Dora Poultry investment project its current value net for the projects was positive and amounted (84325000 I.D), so, the project accepted and preferably to earn revenue while Al-Kharakh Poultry investment project achieved net current value was negative as amounted (48290000 I.D), so, it was refused and not preferably to achieve a loss. The cash flows of Al-Ghalibiya Poultry

Table 1: Comparison between the four projects according to the current value net and included

Investment project name	Current value net NPV	Investment projects order	Notes
Al- Ghalibiya project	160700000	First	The project poultry investment accepted
Al-Dora Poultry	84325000	Second	The project investment project ccepted
Abu-Ghraib Poultry	15210000	Third	The project investment project accepted
Al-Kharakh Poultry	48290000	Fourth	The project investment project refused

Table 2: Profitability indicator for investment projects

Project name	The total current value of internal cash flow	The total current value of external cash flow	Profitability indicator	Investment projects order
Abu-Ghraib Poultry investment project	55770000	40560000	1.38	Second
Al-Dora Poultry investment project	284325000	200000000	1.42	First
Al- Kharakh Poultry investment project	451710000	500000000	0.90	Fourth
Al- Ghalibiya Poultry investment project	1260700000	1100000000	1.14	Third

Table 3: Refund period for investment projects

Investment project name	Initial investment cost	Annual cash flow	Refund period	Investment project age	Investment projects order
Abu-Ghraib Poultry investment project	40560000	30000000	1.3	2	First
Al-Dora Poultry investment project	200000000	75000000	2.7	5	Second
Al- Kharakh Poultry investment project	500000000	90000000	5.6	10	Fourth
Al- Ghalibiya Poultry investment project	1100000000	250000000	4.4	15	Third

investment project wasn't organize and achieved current value net was positive and amounted (160700000 I.D), so, the project accepted and preferably to earn income.

Clarifying that Al-Ghalibiyah Poultry investment project was the first as the current value net amounted (431285000 I.D) as for the second was Al-Dora Poultry investment project (84825000 I.D), the third was Abu-Ghraib Poultry investment project (15210000 I.D), while Al-Kharakh poultry investment project was refused because it achieved a loss.

Investment projects order: From Table 2 noticing that the highest profitability projects was Al-Dora Poultry investment project where the profit indicator reached (1.42) which was higher than the acceptable indicator that was equal one and preferably, Abu-Ghraib Poultry investment project was in the second as the profitability indicator reached (1.38), the third was Al-Ghalibiya Poultry investment project reached (1.14), Al-Kharakh Poultry investment project its profitability indicator reached (0.90) less than one this means that whenever the profitability indicator more than one the investment project was preferably and if less than one the investment project was refused.

Investment projects order: Table 3 shows from accounting refund period for investment projects that the time period (number of years or the months) by it the investment project can get flows net (cash income) to cover all the costs of the project. Abu-Ghraib Poultry investment project was the first as the refund period reached (1 years and 3 months), the second was Al-Dora Poultry investment project as the refund period reached (2 year and 7 months), the third was Al-Ghalibiya Poultry investment project as the refund period reached (4 years and 7 months), the four was Al-Kharakh Poultry investment project as the refund period reached (5 years and 6 months).

RESULTS AND DISCUSSION

Sensitivity analysis for investment projects: The method of sensitivity analysis shows that the change degree in the expected revenue or output as a result of the change in the value of all or one of the specified variables for net cash flows and this means the degree of input cash flows sensitivity with each change in the independent variables that affected on the income of investment projects and then its effectiveness.

To find the sensitivity indicator can using the following equation = net current value under optimism for investment project-net current value under pessimism for investment project investment value in uncertain conditions under the possibility of optimism.

The first investment project was Abu-Ghraib Poultry investment project: The higher management of the company estimated the initial investment cost for Abu-Ghraib Poultry investment project under the conditions of uncertainty between (40000000 I.D) to (50000000 I.D), under the criterion of optimism possibility (40000000 I.D), under the criterion of pessimism possibility (50000000 I.D), the current value of investment was done (50%) in the year before starting the production (50%) in the first year to start operation.

The second investment project was Al-Dora Poultry investment project: The higher management of the company estimated the initial investment cost for Al-Dora Poultry investment project under the conditions of

uncertainty between (180000000 I.D)-(250000000 I.D), under the criterion of optimism possibility (180000000 I.D), under the criterion of pessimism possibility (250000000 I.D), the current value of investment was done (30%) in the year before starting the production (70%) in the first year to start operation.

The third investment project was Al-Kharakh Poultry investment project: The higher management of the company estimated the initial investment cost for Al-Kharakh Poultry investment project under the conditions of uncertainty between (500000000 I.D) to (600000000 I.D), under the criterion of optimism possibility (500000000I.D), under the criterion of pessimism possibility (600000000I.D), the current value of investment was done (30%) in the year before starting the production (70%) in the first year to start operation.

The fourth investment project was Al-Ghalibiya Poultry investment project: The higher management of the company estimated the initial investment cost for Al-Kharakh Poultry investment project under the conditions of uncertainty between (1100000000 I.D) to (1300000000 I.D), under the criterion of optimism possibility (1100000000 I.D), under the criterion of pessimism possibility (1300000000 I.D), the current value of investment was done (25%) in the year before starting the production (75%) in the first year to start operation.

Noting that the sensitivity indicator was 39% as a result of the change in the main effective which was the initial investment cost and thus the current value net changed for Abu-Ghraib Poultry investment project, under the optimism criterion reached (16370000 I.D) and under the pessimism criterion reached (6970000 I.D) in the optimism possibility criterion, the extent change rate in main effective variable was low and reached (-0.014) while in the criterion of pessimism possibility the rate of extent of change in main effective variable increased as reached 0.23, the rate of change in current value net under the criterion of optimism possibility increased 3% and under the criterion of pessimism possibility decreased -17% (Table 4).

For comparison between the investment projects, the sensitivity indicator should be calculated, then compared and evaluated, the investment project that had the lowest sensitivity indicator was the best because the strategic change (sensitivity indicator) had a danger effect on the validity of investment project and the associated risks.

Noting that the sensitivity indicator was 16% as a result of the change in the main effective which was the initial investment cost and thus the current value net changed for Al-Dora Poultry investment project, under the optimism criterion reached (115791000 I.D) and under the pessimism criterion reached (50250000 I.D) in the optimism possibility criterion, the extent change rate in main effective variable was low and reached (-10%) while in the criterion of pessimism possibility the rate of extent of change in main effective variable increased as reached 25%, the rate of change in current value net under the criterion of optimism possibility increased 11% and under the criterion of pessimism possibility decreased -12 (Table 5).

Noting that the sensitivity indicator was -45% as a result of the change in the main effective which was the initial investment cost and thus the current value net changed for Al-Kharakh Poultry investment project, under the optimism criterion reached (2790000 I.D) and under the pessimism criterion reached (939690000 I.D) in the optimism possibility criterion, the extent change rate in main effective variable was zero while in the criterion of pessimism possibility the rate of extent of change in main effective variable increased as reached 20%, the rate of change in current value net under the criterion of optimism possibility increased -4% and under the criterion of pessimism possibility decreased -10 (Table 6).

Noting that the sensitivity indicator was 51% as a result of the change in the main effective which was the initial investment cost and thus the current value net changed for Al-Ghalibiya Poultry investment project, under the optimism criterion reached (298475000 I.D) and under the pessimism criterion reached (204450000 I.D) in the optimism possibility criterion, the extent change rate in main effective variable was zero while in the criterion of pessimism possibility the rate of extent of change in main

Table 4: Change in current value net with extent of change in investment cost for Abu-Ghraib Poultry investment project

Conditions	Main change in strategic effective	Extent of change in main effective	Change rate in current value net	Sensitivity indicator
Optimism possibility	Initial	560000	16730000	39%
pessimism possibility	Investment cost	9440000	9760000	

Table 5: Change in current value net with extent of change in investment cost for Al-Dora Poultry investment project

Conditions	Main change in strategic effective	Extent of change in main effective variable	Change rate in current value net	Sensitivity indicator
Optimism possibility	Initial	20000000	1157910000	16%
pessimism possibility	Investment cost	50000000	50250000	

Table 6: Show change in current value net with extent of change in investment cost for Al- Kharakh Poultry investment project

Conditions	Main change in strategic effective	Extent of change in main effective	Change rate in current value net	Sensitivity variable
Optimism possibility	Initial Investment cost	0	(2790000)	-45%
pessimism possibility		100000000	(93690000)	

Table 7: Show change in current value net with extent of change in investment cost for Al-Ghalibiya Poultry investment project

Conditions	Main change in strategic effective	Extent of change in main effective variable	Change rate in current value net	Sensitivity indicator
Optimism possibility	Initial Investment cost	0	(298475000)	51%
pessimism possibility		100000000	(204450000)	

Table 8: Show comparison between investment projects based on sensitivity indicator

Investment project name	Sensitivity indicator (%)	Evaluation of investment project name
Abu-Ghraib Poultry investment project	39	Second
Al-Dora Poultry investment project	16	First
Al-Kharakh Poultry investment project	-45	Fourth
Al-Ghalibiya Poultry investment project	51	Third

Table 9:Show evaluation of investment projects based on capital balance and sensitivity analysis

Investment project name	Capital balance using			Sensitivity analysis
	Current value net	Profitability indicator	Refund period	
Abu-Ghraib Poultry investment project	Third	Second	First	Second
Al-Dora Poultry investment project	Second	First	Second	First
Al-Kharakh Poultry investment project	Fourth	Fourth	Fourth	Fourth
Al-Ghalibiya Poultry investment project	First	Third	Third	Third

effective variable increased as reached 18%, the rate of change in current value net under the criterion of optimism possibility increased 11% and under the criterion of pessimism possibility increased 3% (Table 7).

So, we can make comparison between the investment projects after accounting the sensitivity indicator to evaluate the investment projects according the extent of change in main effective variable for initial investment cost and change in current value net.

Noting from Table 8 that the best investment projects was Al-Dora Poultry investment project as the lowest Sensitivity indicator for the change rate in income and the risks were lowest, the bad investment project was Al-Kharakh Poultry investment project as it achieved negative rate and the risks were big and there were losses, so, there was a loss in current value net, also the results of capital balance using referred to that and as mentioned in Table 9.

Noting from the table that the best investment projects was Al-Dora Poultry investment project because it ranked the second class according to the method of current value net and the first according to the method of profitability indicator and the second according to the method of refund period and the first method of sensitivity analysis and the worst investment project poultry was Al-Kharakh Poultry investment project because it ranked fourth according to all methods. So, the two researchers can prove the hypothesis of research which is:

CONCLUSION

The most important conclusions reached by the two researchers are: the importance of the capital budget and sensitivity analysis in the change statement in time value of money especially future cash flows. The role of the capital budget and sensitivity analysis in providing accurate information to help the decision makers in making the best investment decision through the comparison between investment projects and evaluated them. The sensitivity analysis showed the change value in cash inflow and outflow under uncertainty and its relation with income and associated risks, any increase in the change rate in current value net under uncertainty with the change in investment costs leads to increase in sensitivity indicator. The current value net method was preferred because it takes into account the value of money for cash inflow as well as specify structure and cash flow time through the life of investment project. The method of profitability indicator referred to the income rate that can be achieved on investment in the future to judge the investment feasibility when comparison between investment projects as the investment project preferred with the highest profitability indicator. The acceptable and sufficient time period can be determined to cover the investment costs of the project through refund period and the investment project preferred that the money recovered in the shorter period.

RECOMMENDATIONS

The most important recommendations are: The necessary to choose standards for evaluation the investment projects based on studied scientific basis that allowed mechanism for the decision maker for comparison between investment projects. Working on the use of the capital budget and sensitivity analysis to measure the investment effectiveness and comparison between investment projects. Training the workers in accounting department on evaluation mechanisms the investment projects to feasibility statement of investment project, the income and risks according to modern accounting methods to give accurate results for comparison between projects. The necessary to specify the desired income rate by the management of the company in accordance with the investment cost, life of project and associated risks. Setting a suitable plan for implementation mechanism of any project and should be flexible and can be modified in case of emergency or under uncertainty conditions.

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