Using an intelligent budget in confronting budgetary slacks.

Extracted from Ph.D. thesis titled:

Using the contingency theory for strategic cost management and supporting an intelligent budget confronts budgetary collusions, moral hazards, and budgetary slacks

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Abstract:

Research Purpose: Proposing an intelligent budget that is proactive, sensitive, and responsive to any changes that might happen. The main purpose of developing that intelligent budget is not only confronting budgetary slacks that results from agents' moral hazards such as budgetary frauds or budgetary collusions, but also the slacks resulting from the sudden or unexpected changes in the business environment which have been referred to it as contingent factors.

Research design/Methodology: The research has been prepared using a combination of both deductive and inductive methodology, through the review of the academic literature of management accounting in the field of budgeting, and also through the creation of a new proposed model for budgeting called the intelligent budget. Also a questionnaire has been conducted to validate the assumptions of the research.

Research Originality: The research is mainly based on evaluating the traditional budgeting techniques and propose a whole new budget calling it an intelligent budget that is a combination of several parts such as the forecasting techniques used in the budget and also the budgeting team responsible for the budget preparation.

Research Findings: It as concluded that, the determination of the forecasting technique itself is highly affecting the success of the proposed intelligent budget. Accordingly, it was suggested that rolling forecast is the most appropriate technique for an intelligent budget due to the continuous modifications allowed to be done in the budget to keep up with the changes as previously mentioned.

The bargaining capacity and the bargaining ability of each agent is a major factor affecting the budget, and knowing that there might be coalitions between the agents is a matter that complicates the predictability of the budget. Accordingly, an intelligent budget should take into consideration the behavioral aspects and the multiple scenarios for each singular item to be determined in the budget.

Keywords: Budgeting, Intelligent Budget, Budgetary Slacks.

Introduction:

Strategic cost planning is an ongoing process of reducing total costs while improving the strategic position of an organization. This objective can be accomplished by having a deep understanding of which costs support the organization's strategic position and which costs either have no impact on it or even weaken it (Kotello, 2014).

Strategic plans are future decisions by default, so it need a very neat future prediction or estimation. The budget is also a future prediction only it is on a relatively fewer time span than the strategic planning.

The future is always linked with the uncertainty and expecting surprises. Here the management accounting should play its role in minimizing this state of uncertainty to ensure business stability (Gieto, 2019). One of the major tools that can be used to minimize the uncertainty surrounding the organization is the contingency theory. Using the contingency theory itself is not a recent recommendation as it has been investigated by researchers from a long time. Using the contingency theory in a contextual framework of budgeting process is the issue that this chapter is dedicated to investigate.

Using a combination of management accounting tools and techniques and blend them together is the objective of this chapter to reach an intelligent budget that is responsive, proactive to changes, and also self-healing budget that is able to fix itself from any defects that might have continuously, improving the strategic position of the organization.

1. What is the intelligent budget?

Intelligence in the context of planning and forecasting means the flexibility of the planning process to be adaptable to the changes in the circumstances around organization that might happen during an accounting period.

An intelligent budget is a budget that is flexible and responsive to any given scenario could happen to the organization. An intelligent budget means the ability of a budget to cope with the high level of uncertainty facing an organization.

The constraints of any given budget is the inability to fairly allocate the available resources between the departments and also the information asymmetry that tackles the performance evaluation function of the budget.

It was thought that a highly responsive budget that can respond to any given change in the circumstances and conditions by which the budget was prepared can be considered as an intelligent budget.

2. The need of an intelligent budget:

The typical budgeting process is often an annual process starts by target setting for the company's revenue and expenses. In many organizations, department managers plan for the expected revenues, and expenses. This annual process can grind up significant organization resources, mostly at the expense of other vital activities regarding the scarcity of the available resources. The result of this process is a finalized budget probably in December that started back in August (Akillioglu and Onori, 2014)

In some companies, this is the only company-planning activity, and in that case, there are significant issues.

The traditional budget probably won't account for surprises like a robbery attack on operations or cargo vessels blocking the Suez Canal, forcing a sudden reconsideration and revaluation of the short-to-medium term impact scenarios. No doubt, those are some examples of some major surprises that you might find it normal for a budget not to be ready for. Still, there are some minor surprises that can have a significant impact on a business such as the bankruptcy of a major supplier, a key customer acquisition by another company, or a spike in the price for a key raw material (Hansen and Stede, 2003).

Without the opportunity to update the budget in the form of a continuous forecast, people will be held accountable for outdated assumptions. Moreover, variance analysis will continually have the "noise" of obsolete comparisons.

The number one reason why companies don't adopt rolling forecasts is that they are very difficult to be managed simply using traditional spreadsheets as it needs some specific requirements to be effective such as a fully integrated platform encompassing financial and operational planning, reporting, and analysis to enable straight-through processing (Oliva and Watson, 2007).

Since the preparation of budgets is done independently of the strategic goals that the organization aims at, the strategic planning process is separate from the preparation of budgets, which makes it not meet the requirements of competition facing organizations in the contemporary environment (Hope, 2006).

The weak ability of planning budgets to support strategic management can be summarized as follows (Axon, 2003):

• Budget implementation follow-up reports according to the traditional approach focusing on deviations between actual performance levels and targeted performance levels, with no focus on the level of strategic achievement achieved.

• Focusing on preparing financial estimates, which weakens the efficiency of resource distribution among departments and increases the organization's low efficiency in exploiting its resources.

• The budgeting process involves a lot of non-value-adding work, making it ineffective.

Indirect costs, whether industrial, marketing or administrative, are general in their relationship to cost centers, and therefore it is difficult to assign or allocate them to cost centers and production units. The difficulty of linking the elements of industrial indirect costs and the unit of the final product. Whereas, the more direct the element is, the easier and just the supposition on the production unit is, and the farther the element is from the state of directness, the lower the proportion of justice and the more difficult it is to assign or allocate it to the production units (De leon and Herschel, 2014).

Diversity and multiplicity of the items of indirect industrial costs, as the items of indirect industrial costs are many and varied, which requires studying each element separately and examining the method of its distribution to the final production centers and units. These elements can be analyzed into indirect materials such as lubricating oils and fuels. Indirect wages such as the salaries of supervisors and foremen and the salary of the factory manager, as well as fixed charges represented in rent, insurance and depreciation. Expenses of industrial facilities such as electricity and water. Industrial losses such as the cost of waste materials and lost time wages (Ranjan, 2019).

From the above it is clear that each of these types of costs needs its own analysis in order to reach the proper technical standard for allocating it to production units. It is also clear that although all these clauses are indirect, the indirect adjective in them differs from one element to another.

Most of the indirect costs elements are related to the time element, where it is difficult to know the values of the indirect costs elements before the end of the costing time period because they are related to the time element more than they are related to the product unit, which requires resorting to estimation and charging them to the units produced through charging rates, then at the end of the period the charged costs are compared On an estimated basis with the actual costs and inventory the differences in preparation for correcting the charged costs (Neves, 2012).

There are many aspects in which intelligence is needed in the stages of the budgetary process. The intelligence is needed in every single step of planning in order to make sure that there is no misallocation of resources or the unfair standards.

2.1 Production planning:

Production planning activities aim to ensure the availability of sufficient resources in order to produce and create finished products according to specified work schedule. On one hand, market conditions with high expectations from the clients and high uncertainty as well. And on the other hand, limited resources or limited production capabilities which represent a

constraint over the process impose high complexity for planning process to cope with on the way to achieve its objectives. Conventional planning approaches which are commonly applied in various industries follow rigid hierarchical structures in order to simplify problem area and thereby to reach improved solutions (Sadek, 2018). However, nowadays such an approach may fall behind in providing effective solutions in response to frequently and rapid changing market conditions. Deficiencies originated from fragmented solution spaces at different levels of a hierarchy (Mehdly, 2020).

2.2 Workload control concept:

The Workload Control (WLC) concept is mainly based on keeping the workload level under control and regulating or coordinating it according to certain principles to enable an improved flow time, less congestion work floor and consequently improved production and delivery performances (Akillioglu et al, 2015).

The major objectives of WLC concept are the control of (WIP) Work in Process level and the balance of workload among the available resources over time. Thereby, improved utilization of the available resources in the shop floor and better production fulfillment rates are targeted to be accomplished and also, reasonable cost rationalization through the reduction of wasted resources and time (Akillioglu et al, 2015).

The underlying reasoning behind the coordination of workloads comes from the very basic relation between throughput rate, work in process and production lead time. Constant introduction of orders or products into a shop or warehouse floor leads to increased queue lengths for the resources which accordingly creates longer lead time for the orders (Quinn, 2019). However, the production rate will stop increasing when any resource of the production cycle reaches to steady state or when one or more resources get fully utilized. From this point and on, the production lead time shall keep increasing due to accumulating WIP without any increase in the throughput rate. This is an obvious indication to the existence of a critical WIP level in the production system (Dencker et al, 2020). In this context, workload

control concept targets to adjust WIP level in any given stage of the production and delivery process in order to smooth production, prevent resource starvation and work congestion and stabilize lead times. Generally, the regulation and coordination of workload through the WLC concept is realized by planning for the production on the right order at the right time and by the right sequence.

2.3 Capacity adjustment:

Capacity control is simply the process of choosing the right production capacity for an organization which is needed to fulfill the changing demand of its products. It is also defined as the maximum actual rate of output or production for a budget, measured in units of output per unit of time (Hill A.V., 2003). The decision of capacity determination is a very much important decision; the wrong capacity decisions might lead to significant consequences of either loss of potential customers or crowded unsold inventory. Also, the capacity determination is very important in performance adjustment of the personnel as well.

Majority of the capacity planning concepts are based on a hierarchical structure of the organization where long term or strategic decisions are taken at higher managerial levels and short term or executive decisions are taken at lower levels. To be more explicit, through the long term capacity decision process aggregated data is used which involves considerable amount of forecasted data. In such hierarchical capacity decision architectures, the implicit underlying assumption is that a feasible schedule at an aggregated level in the long term guarantees a feasible schedule in the short term which consists of detailed schedule (Wortman J. et al., 1996). The problem arises due to the inconsistency between the short term and long term decisions. In this study, the focus will be on short term capacity adjustment as a part of demand responsive planning framework for highly dynamic shop floor environment.

2.4 Multi agent systems:

It is very important to know that multi agent systems (MAS) are used as a means for the implementation of the planning and controlling concepts. Multi agent control enables dynamic scheduling. According to (O'Hare G.M, et al, 1996), a multi agent system is a whole network of problem solvers which work together to solve problems that need collaborative solutions that are beyond their individual capabilities (Wooldridge M. et al, 1995) define MASs as an approach that addresses complex problems where decisions should be based on processing of data from various sources of diverse natures. Each one of these sources can be viewed as an agent where the whole system is a community of agents – multi agent systems (Rhamanian, 2013).

A MAS is consisted of a set of agents with certain characteristics where autonomy and communication skills are the two fundamental characteristics. Objective of a MAS is supposed to be achieved through agent collaboration enabled by information exchange. The use of multi agent systems is common at various knowledge domains such as economics, sociology etc. In general, multi agent systems are exploited in order to avoid problems from centralized control systems (Douglas, 2009).

3.The main pillars of intelligent budget:

As planning is one of the most important functions of budgets, by setting quantitative estimates of future performance targets, but the main feature of the contemporary business environment is the rapid dynamic change in which it is difficult to predict, so the budget in its traditional form becomes obsolete and loses its effectiveness over time, which reduces the Flexibility and ability of organizations to deal with opportunities and threats (Shi et al, 2019).

Therefore, the budget loses the flexibility to achieve continuous development and exploit the opportunities available to the organization, as the traditional system of performance management under the traditional budget is considered a rigid model that does not reflect the economic conditions under which business organizations operate, which are

characterized by rapid change, because the budget represents a fixed contract between subordinates and managers in such a way that it does not change.

In order to prepare an intelligent budget there are some techniques to adopt:

3.1 The Adoption of Rolling forecast:

Rolling forecasts enable managers to anticipate and forecast short-term outcomes and therefore influence them. Forecasts are a quantum leap and development from annual budgets that act as a barrier to fast response. On one hand, budgets and their periodic reviews focus on the forthcoming year-end; managers use them to take whatever the action is required to achieve the agreed pre-set targets. On the other hand, rolling forecasts provide managers with a continuous moving window of the future that would help them to make appropriate strategic decisions, manage cash flows, and set shareholder expectations. But there are many implementation complications that can distort these forecasts and put managers in a worse position than before. These issues will be examined and provide some guidelines that enable managers to place rolling forecasts at the center of the management system (Stukan, 2017).

Many organizations not only spend several months preparing their annual budgets, but also spend many more weeks or even months revising the budget or preparing forecasts in order to give the senior executives a view of the likely year-end position. These organizations may suffer from using limited forecasts that are geared to the fiscal year-end and aimed at help managers to keep on track. Often known as (3+9), (6+6), and (9+3) as the first number represents months of actual results completed while the second number represents the months remaining until the accounting year-end. In some organizations, this approach amounts to four budget recompilations per year – quarter budgets – and thus adds a huge extra burden to an already limited and tired staff (Akillioglu and Onori, 2015). The forecasts are always about asking the question of, are we on track to meet our set targets and, if not, what action do we need to take?

The management needs an early warning of changes that affect the business, particularly if these changes might cause troubles ahead. But most organizations are poor at forecasting. Not only they have a lack of foresight, but also they have an inherent fear of taking stands that might go against the grain of conventional wisdom. At any global company, it takes a huge amount of time and effort to produce a forecast due to the existence of several levels of review and consolidation as the detail involved that one business unit alone spent 585 people working days over eight straight weeks to produce a forecast that will be immediately out of date. Not only the forecasts took too long, but also the quality of that forecast leaves a lot to be desired. Also, most organizations know that their operations will not switch off on December 31 each year and then start again on January 1. They deal with these problems by moving to monthly or, more commonly, quarterly rolling forecasts (Akillioglu and Onori, 2015).

Assuming we are just approaching the end of quarter one in five quarters budget. The management team has the rough figures for that passed quarter and starts to review the next five quarters coming ahead. Four of those quarters they already have from the previous forecast, so they just need to be updated. The team needs to add a further quarter, however. The team should spend more time on the earlier quarters than the later ones, using as much relevant knowledge and business intelligence as it can gather. By definition, the fiscal year-end is always on the twelve- or sixteen-month rolling forecast radar screen (Rogelio and Noel, 2009).

Rolling forecasts, if accurately prepared along with sound information system that connects all the pieces of the organization together and gives the senior management a continuous picture of both the current position and the short-term forward-look. The ideal forecast has to be built on clean data that enables managers to improve decision making. Forecasts should not be seen as commitments, otherwise bias and distortion - dirty data - will be inevitable. That's why implementing rolling forecast under the use of fixed targets rarely works.

3.2 Solid data generation strategies:

One of the most important factor of budgeting is the input data to any given budget. The budget is as good as the data input; the budgeting team cannot produce a sound budget when they are using distorted data. Data distortion could be due to several reasons such as bias of the provider, unavailability of data, the incompetency of the provider, or even the whole wrong data collection or data generation strategy (Eppler, 2021).

Many forecasts are defected due to bias. Many organizations, rely far too much on the opinions of salespeople and managers, rather than using hard or solid data. These biased opinions tend to distort the results because people or data providers may confuse targets (their hopes/benefits) with forecasts (the reality). They also tend to produce reasonable forecast for their own functions and mistrust forecasts from other areas, sometimes they overestimate the effect of marketing campaigns and other revenue-management actions, and use forecasts that differ from those used in other parts of the organization.

(Rogelio and Noel, 2009) interviewed twenty-five people in the sales forecasting process at an electronics firm in California. They found that the organization planning process had been driven historically by the sales function. Sales directors or supervisors were responsible for regional markets are also responsible for making initial forecasts, which they then pass it on to operations and finance. Armed with these forecasts, the department of finance created plans and monitored the results. Finance department tended to pressure the sales team to hike up its forecasts so that the firm could meet its financial goals. Meanwhile, because personnel in the operations department were generally skeptical of the forecasts from the sales team, they made their own forecasts to put the best light on potential inventory shortages for which they might be blamed. Similarly, the marketing managing director took these forecasts from sales and factored in the possible effects of promotions and other activities. This flawed system eventually contributed to an inventory write-off equaling about 10 percent of revenues and the recruitment of a new CEO and executive group.

Forecasts should be seen and used as a tool for strategic management and learning, not for controlling purposes. Such a process should therefore be quick and impartial, and paint a moving ongoing picture of the factors that create financial outcomes. To be quick, the process should only focus on the key performance drivers and involve a few people. To be impartial, forecasts should be an independent process and should be disconnected from targets, performance evaluation, and rewards; only in this way will senior managers obtain unbiased forecasts and estimates that truly reflect what operating managers expect to happen. And to paint a moving or ongoing picture of future financial outcomes, forecasts must constantly look a year or more ahead, thus giving managers time to influence the outcomes.

4. Actions needed to maximize the potentiality of an intelligent budget usage (Bligh, 2010):

4.1 Actions to be avoided:

× **Understand that the purpose of forecasting is not to predict the future but to influence it.**
The mistake that many organizations fall into is assuming that budgets are about predicting and controlling future outcomes. The only certainty about a budget is that it will be wrong. The only question is by how much it will go wrong. Narrowing that variances or the variation comes from learning, experience, and decent information systems. The purpose of a budget is not really much to provide an accurate view of the future but to provide some insights to the future about how strategic options and future events will combine to produce the financial outcomes that you want.

× **Avoid linking budgets to targets, measures, and rewards**.
Most unbiased forecasts are not the ones the top managers want to see. If you ask managers to forecast within a regular budget- or target-based system, don't be surprised when their forecasts magically meet the agreed-on budget or target. And if you asked the managers to set the budget do not be surprised also if the budget was slacked. Managers know that their leaders don't want to be told bad news nor do they want to go to difficult or

tough meetings to explain why the new budget is worse than the previous one. This is why budgeting needs to be unlinked from target setting, measurement, and rewards.

4.2 Actions to be taken:

✓ **Base forecasts on rolling periods of twelve months or more**.
The purpose of forecasting is to provide a more useful information framework for decision making. So they should be done regularly, continuously, and cover a period that enables decision makers to effectively steer the business. Almost inevitably, rolling forecasts go past the next fiscal year-end, thus providing decision makers with more visibility.

✓ **Make budgets based on a few key drivers, not masses of details.**
Compiling budgets from hundreds of lines of details is the wrong approach. In most businesses, very few numbers change much from accounting period to another. It therefore makes more sense to focus on the key drivers of manufacturing, sales, and costs. Many finance practitioners believe that greater forecasting details equals greater accuracy. But this is not right or even rational. Given that each forecast is prone to error, the more forecasts you combine, the greater will be the error, as one mistaken assumption affects another.

Just because budgets and forecasts include a thorough bottom-up approach including a review of all budget line items does not mean by default that the result will be more accurate. In fact, it is just the opposite is more likely to be the case. By concentrating on a few key variables such as sales orders, sales revenue, manufacturing and non-manufacturing costs, and capital. Managers can project the major performance variables without imposing such a heavy workload on participants. The essential point is that they can see the whole picture without getting too involved in discussing every detail. It's doable to get a far better result from the minimum of effort, provided of course that forecasts are not caught up in the measurement process.

✓ **Choose the right forecasting horizon.**

The forecasting period and time taken should reflect the needs of the business. In a financial services business, for instance, there is no physical supply chain or inventories to manage, forecasts should take no longer than a few days. However, in a rapid changing or industrial businesses, forecasts are used to make key decisions about capacity requirements, forecasts often take longer. There is no precise or model answer to the question about the length of the forecasting horizon. It depends on how long an organization takes to make key decisions about operations, capacity, and capital spending. In a fast-moving consumer products businesses, forecasting should reflect lead times. If a given business takes three months to change supply contracts or adjust marketing programs, there is no point in preparing forecasts for less than this period. The horizon also depends on the speed by which the change could happen.

✓ **Recognize that budgets are more accurate at higher levels of aggregation.**

Many organizations use risk-pooling techniques to reduce demand and supply risks. Instead of allowing dealers or intermediaries to order products and make forecasts it is assumed that a distribution center can pool the demand forecasts from dealers, rather than respond to individual dealers' forecasts. The aggregate forecast is much more accurate than the individual dealers' forecasts and results a highly improved customer service.

✓ **Set common standards and rules**

Creating clear methods of standardizing inputs to the sales-forecasting process. If all the salespeople adhere to just the same rules in classifying opportunities, the forecasting model is at least based on similar data standards each time it's run. Standardizing requires implementing rules for classifying sales opportunities. First, defining the stages in the sales cycle. Then, defining the type of progress required to move up a stage. Finally, assigning probabilities of closure based on standard rules. In general, inputs should be based on facts rather than opinions.

✓ **Ensure that forecasting models are consistent and aligned**

It is fine for small, local requirements to use simple spreadsheets for forecasting processes, but spreadsheets can cause problems when they need to be aggregated across and up the organization. In large organizations,

different departments use different assumptions, algorithms, and software, which makes it difficult to combine and consolidate all the forecasts from each and every department. The IT industry is now offering some sophisticated models to enable large organizations to prepare forecasts quickly and consolidate reports. Teams can easily build business rules and structures, then modify the models as their business evolves, easily absorbing changes such as added or modified locations, new or discontinued product lines, or restructured cost centers. Many systems have powerful modeling capabilities that enable user teams to flexibly devise, compare, and assess alternative business scenarios. Such IT systems allow budgeting team to build models in days rather than months.

✓ **Reduce business lead times**

Forecasting or projecting what will happen tomorrow is much easier than what will happen in next six or twelve months. So the shorter the lead time to introduce new products/services or strategies, the more accurate and useful the forecasting process will be. The fast response is the main objective. The main reason any organization forecast is because it can't react fast enough and if it's given a choice of improving the speed of reaction or improving the capacity to forecast, any rational organization should always choose speed of reaction. There's just no debate about this because any forecast by its nature is flawed. It's always going to be wrong every single time. So if you can react more quickly, then that's the best option.

✓ **Match the model to the requirement.**

Any model is a simplified presentation to use to form a prediction. There are three types of models. Statistical models, which extrapolate from historical data to generate a prediction, based on the famous assumption saying that the future will be a continuation of the past. These type of models are often used to forecast revenue lines, including consumer spending and product sales. Mathematical models, which attempt to understand and model the relationship between different and various elements of the business to produce a prediction. Many cost forecasts vary with revenues. Judgmental models, which are in the head or mind of the person producing the forecast. However, judgmental forecasting seems to be simple, human beings are capable of modeling in very sophisticated

ways. The aim is to use the most appropriate model for each part of the forecast.

✓ **Use range forecasting.**

Most organizations prepare forecasts based on single-point estimates of future outcomes. The forecasts are usually simple projection of existing trends. Executive managers often request a number, which implies certainty in the forecast and invariably ends up being the average of the previous periods. The trouble is that averages are in the most cases wrong. And averages added to averages are even more wrong, especially if other assumptions are depending on them. Accordingly, instead of aiming for a single demand forecast that is invariably wrong, big organizations forecast a range of potential outcomes. In this way, the organization becomes better in dealing with uncertain outcomes.

✓ **Allow for random variation, but eliminate bias.**

The greatest budgeting challenge is to produce a budget that is genuinely objective with no errors. budget error is made up of variation based on external fluctuation and bias, or internal systematic error. The problem is that many non-finance people may confuse bias with variation. No budget can avoid variation. By default, it is beyond anyone's control. Variation is caused by, unstable of fluctuating markets and unpredictable either economic or non-economic events and is almost impossible to correct. However, managers should estimate the degree of volatility and provide both control and tolerance ranges that, if exceeded, a danger bell should alert them to investigate whether there is bias in the system.

Bias is considered the real enemy of an effective budget and is deeply existed in many organizations. The most common problem is the second-guessing that can lead to shock profit warnings, as forecasts continuously tell senior executive managers what they want to hear rather than the unpleasant reality. Once a budget becomes a target or a commitment, it ceases to be an effective budget. Managers avoid attention if they provide forecasts or budgeted numbers that fit prevailing expectations. This means that they are less likely to be objective towards forecast outcome.

✓ **Carry out budget analysis to improve their quality.**

Executive managers should learn from their budgeting experience. The purpose is not to find someone to blame on the variance but to learn if

budgeting accuracy is improving and how to improve it furthermore. Budgeting inaccuracy can be seen as a lesson and alert that the organization need to better understand the causes of that variability and work to reduce them.

5. The role of an intelligent budget in confronting budgetary slacks:

There are several defects that budgeting systems or processes suffer from which can be summarized as follows:

5.1 Overcoming the negative moral hazards:

As previously discussed there has to be a reason why the budget process participants tend to commit a negative moral hazard that harms the budgeting process (Zhang and Liu, 2013). That reason maybe the pressure of the top management to achieve an unachievable targets, or it may be the need to maintain the bonuses or incentives since they are linked to the budget actualization, or even to maintain and preserve the assigned resources for the coming periods. Any of these reasons fall in the assumption that there might be a contradiction or conflict between interests of the organization and the individuals related to it.

The intelligent budget tends to alter the main objective of preparing a budget, as it is aiming to be a management accounting control tool, but without linking it to the individual's performance evaluation. Instead it proposes other techniques to evaluate employees and even managers.

The elimination of moral hazards effect on the budgeting process is not only by eliminating the motives for employees and managers, but also by eliminating the chance or the opportunity for committing negative moral hazards such as budgetary frauds or budgetary collusions. The intelligent budget tends to use the game theory along with contingency theory to predict the possible responses of principal / Agent relationship and multi-agent situations in order to reach a reasonable model that fit to a particular organization that enables it to control and oversight any possible collation creations against the organization.

5.2 Overcoming the prediction Incompetency:

One of the major flaws of the traditional budgeting process is the inaccurate projections made by the budget preparation team (Adnan, 2019). These inaccurate projections are made either due to the lack of historical data that to be used in the prediction process, or if the information are available but only to certain managerial levels creating information asymmetry, or due to the long time range of projection or prediction which allows for a lot of changes to happen during the budget period especially in a rapid growing technological era, or finally due to the conflicts between budget goals and organizational strategic goals.

The intelligent budget is proposed to deal with all the previously mentioned factors resulting poor prediction outcomes. The intelligent budget argues that, the optimal prediction method is the rolling forecast method that requires continuous modifications on the firstly made budget month by month. So even if there was a lack of historical data at the early phase of budget preparation, the budget will continue to provide itself with historical data the time goes by. As the budget will use the results of each passed month as an input data for the re-prediction process.

Also, the problem of information asymmetry will cease to exist by using the intelligent budget as one of the major pillars of implementing the intelligent budget is the formation strategy of the budgeting team that requires a representative from each and every managerial level of the organization which ensure that any piece of information available to any managerial level of the organization shall be presented on the budget preparation table (Bergh et al, 2018). Obviously, as the intelligent budget tends to use the rolling forecast model for the prediction process so, there will not be a long rang static predictions anymore as the budget is much more responsive to the change or it can be described as a self-healing budget.

Descriptive statistics for demographic variables: -

A descriptive statistical analysis has been carried out, including frequencies, percentages, means, standard deviation, and coefficient of variation, for all characteristics of the sample, independent and dependent variables.

Table 1 Descriptive statistics for the field of experience: -

Description	Frequency	Percentage
Academic	106	38.2 %
Professional	171	61.8 %
Total	277	100%

It can be concluded from table 1 that the professional Management accountants in the manufacturing organizations represents 61.8% of the sample while the academics represent 38.2% of the sample.

Table 2 Descriptive statistics for the Period of experience: -

Description	Frequency	Percentage
Less than 5 years	74	26.7 %
Between 5 years and 10 years	111	40.1 %
More than 10 years	92	33.2 %
Total	277	100 %

It can be concluded from table 6.10 that 26.7% of the population participated in the questionnaire have an experience period less than 5 years, 40.1% of the population participated in the questionnaire have an experience period between 5 years and 10 years, and 33.2% of the

population participated in the questionnaire have an experience more than 10 years.

Reliability and intrinsic validity for research variables:

Table 3 Descriptive statistics for Considering an intelligent budget to confront budgetary slacks: -

No.	Statements	MEAN	SD	CV	Rank
1	Forecasts should be seen and used as a tool for strategic management and learning, not for controlling purposes.	4.55	0.579	12.73	5
2	Multi-agents organizational structure increases the possibility for alliances and coalitions creation.	4.09	0.775	18.46	9
3	Coalitions and alliances can change on a strategic scale.	4.18	1.138	27.22	11
4	Rolling forecasts enable managers to anticipate and forecast short-term outcomes and therefore influence them.	4.29	0.555	12.94	7

5	The bargaining capacity of the agents is considered a key driver for budget resource allocation.	4.36	0.558	12.80	6
6	Lack of historical data to particular product stimulates budgetary slacks.	4.02	0.845	21.02	10
7	Using contingency theory enables the budgeting team to predict the most possible scenarios for a given budget situation before it happens.	4.55	0.561	12.33	4
8	Contingency theory enables the organization to predict several future scenarios for one change in the budget variables.	4.49	0.533	11.87	1
9	Focusing on preparing financial estimates weakens the efficiency of resource distribution among departments and increases the	3.71	1.261	33.99	13

	organization's low efficiency in exploiting its resources.				
10	The budgeting process involves a lot of non-value-adding work, making it ineffective	4.61	0.615	13.34	8
11	It's a must for the budget in order to be intelligent, to be a quick responsive budget, sensitive to any changes that might happen.	4.52	0.551	12.19	3
12	It's a must for the budget in order to be intelligent, to be a quick responsive budget, sensitive to any changes that might happen.	4.68	0.570	12.18	2
13	The work load level is affected by the budgeting process.	3.88	1.242	32.01	12
	Total	4.5811	0.46026	10.05	--

According to Descriptive statistics in table 3, it can be concluded that:

- The most five homogeneous variables are: Contingency theory enables the organization to predict several future scenarios for one change in the budget variables, It's a must for the budget in order to be intelligent to be a quick responsive budget, It's a must for the budget in order to be intelligent to be a quick and responsive budget and also sensitive to any changes that might happen, Using contingency theory enables the budgeting team to predict the most possible scenarios for a given budget situation before it happens, and Forecasts should be seen and used as a tool for strategic management and learning, not for controlling purposes. With coefficient of variation (11.87), (12.18), (12.19), (12.33), and (12.73) respectively.

- On the other hand, the most five heterogeneous variables are: Focusing on preparing financial estimates weakens the efficiency of resource distribution among departments and increases the organization's low efficiency in exploiting its resources, The work load level is affected by the budgeting process, Coalitions and alliances can change on a strategic scale, Lack of historical data to particular product stimulates budgetary slacks, Multi-agents organizational structure increases the possibility for alliances and coalitions creation. With coefficient of variation (33.99), (32.01), (27.22), (21.02), and (18.46) respectively.

- While the value of total weighted mean for the cost rationalization process is (4.5811), with coefficient of variation (10.05), therefore we have a totally agree direction to the cost rationalization process dimension.

Table 7 T-test to measure the significant differences between sample's mean and population's parameter (μ = 3.4)

No.	Dimension	MEAN	SE	T-Test	Significant level
1	Rewards dependent on budget attainment motivates for budgetary slacks.	4.44	0.034	30.776	0.001***

2	Internal rivalry between departments can cause a budgetary slacks.	3.77	0.061	6.064	0.001***
3	Agents behavior and moral hazards are key drivers for slack creation attempts.	4.38	0.035	28.297	0.001***
4	Information asymmetry stimulates budgetary slacks.	4.15	0.043	17.264	0.001***
5	Budgetary slack is generally results from Internal conflict of interests.	4.16	0.051	14.990	0.001***
6	Managers can commit budgetary frauds seeking to retain the allocated resources to their departments without any cutting or minimization in the following period.	3.81	0.073	5.612	0.001***

7	Imposed (top-down) budget is better for solving slack creation problem.	4.22	0.044	18.671	0.001***
8	Participative (bottom-up) budget is better for solving slack creation problem.	4.52	0.035	32.183	0.001***
9	Negotiated budget (Reciprocal budget) is better for solving slack creation problem.	3.80	0.071	5.640	0.001***
	Total	4.1209	0.04367	16.508	

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- *** Parameter is significant at the (0.001***) level.
- According to T-test in table 7, it can be concluded that:
- There are significant differences between sample's mean and population's parameter ($\mu = 3.4$), at significant level less than (0.001***) in terms of all variables and total construct regarding the adoption of an intelligent budget towards the budgetary slacks. As the responses proved that the main dimensions of the intelligent budget are contributing in the reduction of budgetary slacks. Therefore, and accordingly, we reject null hypothesis that ($\mu = 3.4$) according to five Likert scale, and we accept alternative hypothesis that ($\mu > 3.4$). This validates the hypothesis which said that "there is a negative statistical relationship between the adoption of an intelligent budget and budgetary slacks".

References:

- Akillioglu H., Dias-Ferreira J., Onori M., (2015): "Characterization of Continuous Precise Workload Control and Analysis of Idleness Penalty", Journal of Computer & Industrial Engineering. Special Issue: Contributions to Society of Information, Manufacturing and Service Systems Developments.

- Akillioglu H., Ferreira J., (2018): " Continuous Precise Workload Control: A myopic approach". Journal of IEEE Transactions on Automation Science and Engineering.

- Akillioglu H., Ferreira J., Onori M., (2014): "Demand Responsive Planning-Workload Control Implementation", The Assembly Automation Journal, Emerald Press, UK, Volume 33, Issue no.3, pages 247-259.

- Bergh, Donald D., Bryan K. Boyd, and Katalin,Takacs Haynes (2018): "Contingency hypotheses in strategic management research: Use, disuse, or misuse?", Journal of management, Volume 38, Issue no. 1, Pages 278-313.

- De Leon L,Rafferty,P., Herschel,R,(2014)," Replacing the Annual Budget with Business Intelligence Driver-Based Forecasts", Intelligent Information Management,V4,pp6-12.

- Dencker K., J. Stahre, L. Mårtensson, Å. Fasth, H. Akillioglu, (2020):" Proactive Assembly Systems –realizing the potential of human collaboration with automation", the annual reviews in control Elsevier, Special Issue, Volume 33, Issue no. 2, pages 230-237.

- Hope, Jeremy (2006): "Reinventing the CFO: How Financial Managers Can Transform Their Roles and Add Greater Value.", Harvard Business School Press, Boston.

- Libby, T., and Murray, Lindsay R. (2007): "Budgeting unnecessary Evil.", CMA Management, Volume 77, Issue no. 1, pages 30–33.

- Murray, V., & Gandz, J. (1980): "Games executives play: Politics at work." Business horizons journal, Volume 23, issue no. 6, pages 11-23.

- Mehdly, Adnan Rabie (2020): "The effect of managerial policies on Production constraints in the high rival industry, journal of economics and human development, Saad Dahlab El Beleeda University, Algeria, Volume 3, Pages 1-21.

- Neves P., Ferreira J., Akillioglu H., Maffei A., Onori M., 2012, "Evolvable Production Systems: Recent Developments and Research Directions". SPS 2012, Linköping, Sweden.
- Oliva, Rogelio and Watson, Noel (2007): "Managing Functional Biases in Organizational Forecasts: A Case Study of Consensus Forecasting in Supply Chain Planning,", Harvard Business School, Boston, pages 7-24.
- Quinn, Natalie S. (2019): "Characterization of Continuous Precise Workload Control and Analysis of Idleness Penalty", Joint conference CIE and IMSS, Istanbul, Turkey.
- Ranjan, Jayanthi,(2019)," Business Intelligence: Concepts, Components, Techniques And Benefits" Journal of Theoretical and Applied Information Technology.
- Stukan, A. and D. Karimson (2017): "ERP Implementation strategies in SMEs : A case study of Swedish manufacturing firms", journal of KTH Industrial Management.
- Shi, J., J. Wan, H. Yan and H. Suo (2019): "A survey of cyber-physical systems. Wireless Communications and Signal Processing (WCSP), International Conference on, IEEE.
- Stede, Garvis (2002): "Agency theory and organizational excellence", 1st edition, University of Denver, Colorado, United states.
- Zhang, W. and Liu, Bin (2013): "The Adverse effect of Budget Constraints and fraud on oil industry in china", Zhejang university press, 2nd edition, China.