

An Integrated Framework for the Role of Managerial Accounting Information System in Business Process Reengineering: An Analytical Field Study

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Abstract: We identify the role of Managerial Accounting Information System (MAIS) in providing the necessary information needed for Business Process Re-engineering (BPR). An analytical field study was conducted which comprises the BPR concepts, goals, motives and steps. The field study is conducted through personal interview and questionnaire to test the five hypotheses formulated from the theoretical study. It is shown that there are several factors that push the organizations to conduct the BPR, such as the accelerated developments in production and information technology, severe competition on both domestic and international levels and growth of the customer care concept. The BPR requires information in several areas which should be provided by the MAIS. The Traditional Managerial Accounting Information System (TMAIS) is not capable of fulfilling its role in the completion of BPR, and Strategic Managerial Accounting Information System (SMAIS) provides valued information about customers and competitors which help the organization to perform some of BPR. However, the BPR requires some more information which is not provided by SMAIS. There are several considerations that should be taken into account when the MAIS designed for the purposes of BPR. Furthermore, there are agreement between the finding of field study and the analytical study derived from the literature in this regard.

Keywords: Business process re-engineering, traditional managerial accounting information system, strategic managerial accounting information system, suggested framework for managerial accounting information system, Egypt.

1 Introduction

Contemporary business organizations are facing many challenges, such as intensive competition, liberalization of global trade and subsequent developments on the production and information technology fields. Moreover, the continuous changes on the customer preferences and the adoption of consumer considerations as a key point for any improvement within the organization.

These challenges have placed all organizations in a difficult position, and they can't be sustained by standing on the traditional perceptions. The persistence and success of the organization is based on its ability to adapt to the challenges it faces, and the way it responds to these challenges. The management of the organizations has to respond to such challenges by using business process re-engineering (BPR) as managerial technique. Managerial accounting can play an

important role in reforming the organization structure (Alawattage and Alasid, 2018).

The aim of a re-engineering project in general is to improve the efficiency and effectiveness of an organization (Herath, 1996; Gupta, 2005). Hammer and Champy (1993) define BPR as fundamental rethinking and the radical redesign of business processes to bring about dramatic improvements in performance. BPR is a technique that helps the organizations to rethink how they do their work in order to dramatically improve customer service, cut operational costs, and become world-class competitors. The motivation for re-engineering is development and placement of sophisticated information systems and networks.

The re-engineering comprises the change not only in one perspective but also the structural change in the whole organization. This change involves modifying communications, powers, behaviors and how to perform the

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tasks within the organization. Such reengineering will improve the information flow, reduce costs, establish linkage with suppliers and reduce time to customer needs (Galani, et al. 2010).

Managerial Accounting Information System (MAIS) has worthy information about company processes which can support the BPR in all stages. During the planning stage of BPR, MAIS can coordinate the information flow between different departments, collect, analyze and understand managers' information requirements in order to plan information execution system requirements (Assad, 2010). It can look at alternative ways of doing things and predict the end results. It helps to collect and organize benchmarking activities which requires share and collaboration with competitors and assess the current and required costing methods. MAIS' role in implementation stage, can monitor the new processes after BPR application, analyze if the information objectives are being met, look where improvements can be made and ensure that managers are provided with the information which they require (Assad, 2010; Mahenthiran and Kershaw, 1998).

The MAIS is expected to provide meaningful information about business processes and improve efficiency and effectiveness. It has been suggested that the MAIS can play a vital role as internal information provider in reengineering (Herath, 1996). Bowman (2015) suggested that accounting and critical accountants have a role to play in challenging the political narratives about transformation even in the privatized utilities such as rail. In a BPR, the MAIS's function is to provide relevant and important information to eliminate waste and non-value adding activities. The role of the MAIS, as the leader of BPR, is to contribute significantly in building trust and breaking down the duty barriers. It can act as catalyst, researching and providing analysis, assessing improvement proposals, facilitating workshops and improving communication by bringing together service providers and service receivers in order to effect improvements (Pietrzak, and Wunk-Pol, 2015). Resource allocation is another important area to which the MAIS should essentially contribute by providing relevant information. By radically redesigning the resource allocation process, an organization can minimize the use of limited resources. Organizations are emphasizing the relationships among resource allocation, change management and strategy formation in their attempts to achieve competitive advantage.

Considering the need for BPR to cope the challenges, and the need for information to complete its various stages, this research is evolved to evaluate the traditional role of MAIS in conducting BPR, and whether the new developments in management accounting (strategic perspective) are providing the necessary information for the BPR.

The main objective of this research is to identify the information needed for BPR and determine the role of MAIS in conducting BPR. Then evaluate whether the traditional, strategic and applied MAIS provide the necessary information for the purpose of BPR, and asses the need for suggested framework to provide the needed information.

This search expands the role of MAIS to help the management in the case of BPR, and by developing the MAIS to coupe any new challenges. It's also contributes to the practice by suggested a practical framework to provide the necessary information for BPR. In Egypt, as many other countries, the business organizations are also facing challenges, and then they are expected do BPR for some of their operations as an attempt to occupy distinct positions in domestic and international markets, which justify the need for the BPR and develop the MAIS to provide the needed information for BPR.

The remainder of this research is organized as follows; In Section 2 the study briefly reviews the BPR concept, goals, motives and steps. Section 3 presents literature review and hypotheses development, including the information needed for conducting BPR the traditional, strategic and applied managerial accounting information systems and BPR; the suggested framework of role of MAIS in BPR. The research method is covered in section 4 while section 5 discuss the results. Section 6 embraces the conclusions and section 7 is for the references.

2 Business Process Re-engineering (BPR)

2.1 Business Process Re-engineering Concepts

Business process reengineering can be defined as one approach for redesigning the way work is done to better support the organization's mission and reduce costs. It starts with a high-level assessment of the organization's mission, strategic goals, and customer needs. Herath (1996) stated that BPR is a program designed to improve business processes by eliminating or minimizing non-value-adding activities. It is possible that different reengineering projects can be used to achieve different organizational objectives. Hammer and Champy (1993); Bhaskar (2012) provide a number of frameworks for achieving radical improvements in businesses through reengineering existing business processes and activities.

The usefulness of a reengineering process depends not only on its association with the organization's effectiveness, but also on its adaptability. The extent to which a particular reengineering project is associated with the organizational structure, its culture, and the overall leadership style may indicate the degree to which the reengineering project achieves its intended outcomes.

From the above definition and based on (Hammer and Champy, 2003; Hammer and Stanton, 2000) we note that the BPR includes the following basic elements:

- Basic rethinking in the organization's operations and redesigning such operations.
- Focus on processes rather than tasks.
- Radical and significant change.

2.2 Business Process Reengineering Goals

Bennis and Mische (1995) stated that the reengineering has a remarkable success in the treatment of problems for the organizations and strengthen their competitiveness. The reengineering could increase productivity by achieving the flow of work, maximizing the owners' return. This can be done through the implementing of tasks in innovative ways, achieving high results, and controlling the functions and operations of the organization. It is not only a cost saving but also it's a growth and comeback (Sandberg, 2001).

2.3 Business Process Reengineering Motivations

Hammer and Champy (2003) believe that the most important factors driving the re-engineering of the organization are, customers competition, and change. Customers are now more aware and knowledgeable about their needs than they were in the past. They have become multi-demands and exercising a great deal of pressure on their suppliers. A competition, which was in the past local and limited today has become a local, international and more severe. The change has become a sign of the new eras and the organizations deal with a world of rapid change. Organizations should change its priorities from the traditional focus on planning, control and growth to the creativity, flexibility, quality, enhanced service, and reducing cost. The most important mechanism added by reengineering is to focus on operations and development as the core of management (Al-Ali, 1999).

The American corporations realized at the end of the eighties of the last century that the old methods which concentrate on developing the product quality, manufacturing and after-sale service are no longer valid in this era. They also discovered that the existing tools to improve the performance of their operations did not fix the ongoing problems related to the high cost, low quality and the bad service. To address these problems, the companies have adopted the concept of reengineering, which helped them to achieve impressive improvements in performance (Hammer and Stanton, 2000). Examples of the companies reengineered are Ford, Taco Bill and Hallmark. As Hammer reported, Ford benefited drastically from this change with an almost 75% decrease in workforce in the accounts payable department.

The adoption of reengineering should not be limited to the organizations in developed countries, but also extends to organizations in developing countries. These organizations have more needs for reengineering to develop their operations, so that they can survive and continue to take their place among the organizations in the developed countries (Haras, 1997).

In summary, there are several factors in the modern business environment which pushed the organizations in both developed and developing countries to adopt the concept of reorganization as philosophy and managerial technique. The most important of these factors are the accelerated developments in production and information technology, severe competition on both domestic and international levels, customer care, total quality, environmental protection and the issuance of international standards. The importance of these motives are confirmed through the field study as shown in Table (1).

Table 1: the results of respondents for the motivations of BPR.

Statements	Average	Standard Deviation
- Applying the agreements of World Trade Organization (WTO) and increasing the level of competitions.	4.28	0.649
- The accelerated developments in the production technology.	4.40	0.712
- The developments in information and communications.	3.96	0.721
- Attention to total quality in organizations and at international level (ISO).	4.28	0.826
- Customer orientation and continual change in consumer favorites	3.87	0.947
- Reduction of the product life cycle.	3.96	0.590
- The successive changes in economic conditions.	4.13	0.875
- Strategic alliances between organizations in both internal and external levels.	3.96	0.978
- Increasing the size of organizations, the diversity of products and the decentralization in management.	3.91	0.952
- The desire to develop the organization for the purpose of survival.	4.04	0.884
- The desire to solve the specific problems (such as weak competitive position).	3.96	0.833
- The desire to prevent potential problems.	4.11	0.840
- Others	-	-

Level of significant < 0.05

It is noticeable from the table above that the actual average of the respondents' answers are between 4.40 and 3.87, and all these averages are higher than the mid-point answer scale (3), which means that most of the answers are classified between "important" and "very important".

2.4 Steps of Business Process Reengineering

There is no specific steps or stages that fit all organizations for performing the BPR. Each organization adopts the approach that suits it, based on several factors such as the degree of the need for reengineering, desire and conviction of the administration. Moreover, the nature of the organization's activities, the size of the organization's operations and capabilities and resources available, the reengineering team are other important factors (Abdel-Wahab, 1998). According to some previous studies (Herath, 1996; Herath and Gupta, 2005; Hammer and Champy, 1993), the BPR steps could include the following:

- Determining the organization's vision (and then setting goals)
- Mapping current processes
- Benchmarking
- Redesign processes (innovation in design)
- Change processes, organizational structure and implementation

3 The Hypotheses Development

3.1 The Information Needed for Reengineering

The role of management accountants has evolved from measuring and reporting business activities to participating with other disciplines in designing and implementing improvement initiatives (Albright, and Lam, 2006). The success of the BPR requires the integration of several dimensions, such as the technical dimension (process re-engineering), the administrative dimension (re-engineering management), which includes organizational restructuring and change of behavior. It also requires the availability of appropriate information to complete all BPR stages. Information technology plays a key role in this regard, they represent an essential factor in the re-engineering. Among the most important areas of re-engineering and the information required are (Ammar, 2017; Arnety, et al. 2017; Borgianni, et al. 2015; Weerakkody, and Vishanth, 2003).

- Information to determine the need for BPR.
- Information to identify contemporary challenges faced the organization (trade liberalization, ISO, customer care ...).
- Information to identify the environment surrounding the organization (competitors, industry...).

- Information to identify management concerns associated with the BPR.

- Information about the dominant values, beliefs and cultures in the organization during the re-engineering process.

- Information for preparing of the BPR.

- Information about the processes that should be re-engineered.

- Information about the safety of operations that have been re-engineered.

- Information about the modification in the design processes (design innovation).

- Information about benchmarking as essential measurement reference through all the BPR stages.

- Information to achieve the linkage and integration between all the various components of the organization during the BPR.

- Information about the allocation of resources within the organization in a manner that serves the BPR.

The information needed for the BPR should be provided by MAIS. There are some facts that this system is the one to be delegated with BPR. These facts include:

- The correlation between accounting and management. Any development in the management thought should be accompanied by the development of the accounting work. Since the reengineering is the philosophy and the scheme to the administrative, so the accounting system is able to provide adequate reports to serve the multi-dimensional and stages of reengineering (Burns, 2000; Burns and Scapens, 2000).

- The accounting system is the formal system of the organization to provide with all information needed for decision making. The other systems such as marketing, production and individuals are unofficial information systems, and they are not able to provide comprehensive reports to decision makers (Attaran, 2004).

- Accounting system's primary job is to provide interested parties inside or outside the organization with the needed information. This system is qualified to meet the needs of these parties from any information.

- The accountant as director of information systems in most organizations has the ability to lead the reengineering process.

In the light of previous discussion, the BPR requires information in several areas which should be provided by the MAIS, and the following hypothesis should be formulated:

H01 “There is no significant difference between the information that should be provided by the MAIS and the information needed for the BPR”

3.2 The Traditional Managerial Accounting Information System and BPR

The question raised in this regard about whether or not the TMAIS is able to carry the BPR, or this system needs to be developed for this purpose. The primary focus of TMAIS is to provide information for the management about economic operations within the organization. It does not address the external environment, especially about competitors. Since the reengineering is the result of many rapid changes in today's business environment, provision of information for the purpose of reengineering was not among the objectives of TMAIS. The tools of this system is constructed to provide traditional information, however, the BPR requires strategic information that is not provided by such system.

The TMAIS tools are not proper to guide the modern organizations (information era organizations), which believe that the creation of future value is through investment in customers and employees, technology and innovation. These are key considerations in the BPR. TMAIS does not focus on the information from outside the organization such as competitors and industry conditions (Wilson and Gilligan, 2005). Then it is not able to achieve the benchmarking as reference measurement which would stand on the areas that need reengineering, and evaluate the consequences of BPR. Also, it is not able to identify the raised contemporary challenges such as trade liberalization, ISO, and customer care.

It focuses on the duties, not on providing information about operations. It still concentrates on the idea of cost centers and responsibility centers, therefore we can say that the TMAIS is not able to stand on the processes that need to be reengineered to improve its performance.

TMAIS does not provide information for the purposes of the strategy, which is the basis to complete BPR to occupy a privileged position among competing organizations. It does not focus on the achievement of the total quality, because it is not among its goals. It focuses on the measurement and control of the cost using standard cost as a tool (Omran, 2005).

TMAIS does not help the management to achieve the best allocation of the available resources, which is one of the reengineering goals. Also it does not enable the organization to reach the optimal mix of products (Kaplan, 1988). It measures and evaluates the performance using the traditional

performance measures. Those that measure only the financial aspect, in spite of the other.

In summary, the TMAIS is not capable of fulfilling its role in the completion of reengineering process, which is a vital requirement for most organizations to take advantage of the modern era. As the MAIS should be the most supporting systems in BPR, the survival of this system would be stand on doing such job. Based on the previous discussion, the TMAIS is not able to provide the information needed for the purpose of BPR. Therefore, the following hypothesis could be formulated:

H02 “There is no significant difference between the information provided by the TMAIS and the information needed for the purpose of BPR”

3.3 The Strategic Managerial Accounting Information System and BPR

The Strategic Management Accounting Information System (SMAIS) is concerned in providing all the administrative levels with information through processing all data from inside and outside the organization. This system uses innovative tools and methods, taking in the considerations the potential environment of contemporary organizations (Simmonds, 1981; Bromwich 1990; Wilson, 1995). Perhaps SMAIS supports the BPR, through analyzing the strengths, weaknesses, opportunities and threats (SWOT analysis) within the organization. Under this perspective SMAIS is seen as an open system with the internal and external environment. The analysis of the previous studies illustrates the basic dimensions of this system. These dimensions could be summarized in analyzing the competitor performance, strategic cost management and achieving the integrated performance measurement (Simmonds, 1986; Lord, 1996; Morgan, 1999; Roslender, 1995; Roslender and Hart, 2002; Roslender and Hart, 2003).

-Analyzing the competitor performance

Management accounting has become involved in providing information on competitors, so the organization can stand on the strengths and weaknesses points of the competitors' performance. It is an attempt to predict the strategies and decisions of competitors, as well as anticipate their reactions to the decisions of the organization and strategies. TMAIS has focused in providing internal information to management. SMAIS provides information about competitors, through cooperation between the managerial accountant and concerned departments, especially the marketing department, which links the organization with external parties.

The most important information that is collected about the competitors are the activities, market share, costs and prices, product specifications, technology used, competitor

strategies, breakeven point, and the time it takes to develop the product or provide a new one. This information can be used to analyze and assess the competitive position of the organization, and then to identify possible areas of development in products, activities and operations.

-The Strategic cost management

Cost management is defined as all actions and efforts of management in order to meet the needs and desires of the client, while continuing to cost control and reduction. In this regard, the organization's efforts to reduce costs are concentrated in two main areas. The first one is the activities that add value to the product from the customer's perspective, and the second is the efficient management for cost drivers and activities that add value to the product (Horngren et al. 1997; Covaleski et al. 2003).

The cost reduction can be achieved through comparing the organization's costs with the competitor's costs. The organization adopts a cost reduction in the light of this perspective as a strategy. Through this strategy the organization can eliminate any wasteful and loss factors in its resources, while maintaining the quality of the performance of various activities. The strategic cost management is based on a set of integrated tools and methods, which aims to develop management accounting information, such as strategic cost analysis, target cost, function cost analysis (Hiromoto, 1991; Yoshikawa et al. 1993; Shank and Govindarajan, 1992; Browmoich, 1990)

-The Integrated performance measurement

The contemporary business organizations concern not only the financial performance but also other aspects such as the customer satisfaction, they also introduce new products, sales growth and increase the market share. Therefore, these organizations have embraced the idea of integrated performance measurement. SMAIS should provide necessary information to achieve integrated performance measurement. Through the integrated performance measurement, the goals and strategies of the organization are translated into performance measurements, which can be used as standards in monitoring the achievement of these objectives and the implementation of those strategies.

Under the integrated performance measurement, the consideration is not limited on the financial dimension, but extends to other nonfinancial dimensions. It is no longer that the financial dimension occupies the attention of the decision-maker, but the non-financial changes may be the direct reason for taking substantive decisions. The integrated performance measurement does not limit the performance assessment on internal comparisons but extends to comparisons with competitors and industry rates.

There are several appearances to achieve the integrated performance measurement, such as the balanced scorecard (Kaplan and Norton, 1992), the performance pyramid (MacNair, et al. 1990), benchmarking (Elnathan, et al. 1996)) and strategic performance review (Morgan, 1999).

The SMAIS can support the BPR through all the reengineering stages. To determine the extent to which the organization needs for reengineering, this system can provide important information about the weakness areas that need to be reengineered. Also, it can provide information about the customer satisfaction regarding the product quality, price and after-sale services. SMAIS provides sufficient indicators that can illustrate the need for a reengineering process.

The strategic management accounting can play important role in the preparing stage of BPR. The diffusion of the culture of re-engineering among workers which usually rejected from them. The success of the BPR is based on persuading workers and obtaining their loyalty. It can convince the workers about the current situation of the organization compared to competitors, and the threats of losing the competitive position. Also, it can show the positive effects or BPR and the workers benefits from it.

SMAIS can help in determining the organization's processes. It has adopted the concept of strategic business unit to measure and evaluate performance. The strategic business unit could be a department, a branch or a sector of the organization which has its own strategy, it produces a distinctive product, and has specific customers. On the other hand, the process for the purposes of reengineering is defined as a group of related tasks that produce valued specific output (Davenport, 1993).

It can be noted that the concept of strategic business unit, and the concept of the process are consensus. Both concepts have distinct output, and they serve a specific group of customers, their performance can be measured independently, and both are capable of taking the necessary strategic decisions. Under such a consensus, it is easy to identify the processes that need to be reengineered.

SMAIS can measure the consequences of the reengineering process to ensure its success. Such measurement requires sitting of selected criteria to evaluate the success and use these criteria to follow the actual implementation of this process. The most important criteria are cost reduction, delivery speed, performance quality, product quality, market share, sales volume, selling prices, unit cost, profits and customer satisfaction. These criteria are expected to measure the financial and non-financial performance to measure the success of BPR. SMAIS can provide reports that include the targeted and actual outcomes of BPR in order to evaluate the achievement of its goals.

From the previous discussion, we can infer that SMAIS provides valued information about customers, competitors which help the organization to perform the SWOT analysis and determine strengths, weaknesses, opportunities and threats. However, the BPR requires some more information which is not provided by such system. Therefore, the following hypothesis could be formulated:

H03 “There is no significant difference between the information provided by the SMAIS and the information needed for the purpose of BPR”

3.4 The Applied Managerial Accounting Information System and BPR

Alawattage et al. (2007) documented that the management accounting practice in less developed countries did not address important issues such as poverty reduction, corruption, community involvement, history, culture, and politics, which means it is still far from the community. Hopper et al. (2009) found that research in managerial accounting in these countries is growing. However, (Ashraf and Uddin, 2016) showed that the less developed countries (Pakistan) applied the reform program in the public sector corporations and saving cost was the most imperative result. The Egyptian companies vary in applying the MAIS. Some companies implement advanced systems while others are stuck with the traditional systems. Abdel-Al and McLellan (2011) studied the adoption rate of management accounting practices by two hundred and fifteen Egyptian manufacturing companies and the results indicate that Egyptian manufacturing organizations are still using traditional management accounting practices as they fit well with managing in an unstable economy. Another study confirms that management accounting practices have changed, and the management accountants have become more involved in planning and control (Youssef, 2011).

Furthermore, (Mohamed F., 2013) investigated whether changes in the business environment lead to changes in the level of Management Accounting Practices (MAPs), and whether the level of MAPs affects the company's ability to achieve competitive advantages. Findings of this study indicate that the company applies modern technology in all its activities, especially production systems and faces fierce price competition. Findings also reveal that the company applies traditional and modern MAPs alike. Abdel-Maksoud et al. (2012) found that the levels of implementation of contemporary management accounting practices in the survived Egyptian companies is high, while the levels of implementation of contemporary management techniques are found to be below average.

Based on the previous discussion, the AMAIS on the Egyptian companies are still traditional and they do not

provide the information needed for the purpose of BPR. Therefore, the following hypothesis could be formulated:

H04 “There is no significant difference between the information provided by the AMAIS on the Egyptian companies and the information needed for the purpose of BPR”

3.5 An Integrated Managerial Accounting Information System for the Purpose of BPR

The success of the reengineering process depends primarily on the quality of MAIS designed for this purpose.

Therefore, several key considerations should be taken when designing this system as follows:

- Develop the managerial accounting tools to fit in with contemporary management needs, such as the reengineering process. This development should be reflected on adopting the SMAIS.

- Develop management accounting database for the reengineering process by including unconventional data associated with this process. One of the most important data to be considered is the administrative policies. These policies include changes in the organizational structure, incentive systems, and management pattern. Also, another data needed regarding, growth changes in the industry's indicators, market conditions as well as the community.

- Participate the users of MAIS in designing such system. This would increase confidence, and also get the support from the users to conduct BPR.

- Develop the MAIS to reflect the top administration's concerns in the various stages and steps of BPR.

- Develop the MAIS to achieve the optimal allocation of resources, which could be reached through preparing accurate plan and dealing with performance centers as independent and integrated units. Also, the goals of these units must be consistent with the overall objectives of the organization.

- The MAIS must be cooperated with other information systems in the organization such information inventory control systems, personnel and marketing.

By taking the previous points in our considerations, the MAIS will be able to provide more information that enable the top management to perform the BPR. Therefore, the following hypothesis could be formulated:

H05 “There is no significant difference between the information provided by the suggested MAIS and the information needed for the purpose of BPR”

4 Research Methodologies

The methodology of this research is an analytical field study that includes two main parts; one as theoretical which is interested in reviewing the accounting literature on the BPR, and the other as field study to test the hypotheses. To test the hypotheses of the study, we use nonparametric statistics because the data used are descriptive. Each hypothesis requiring appropriate test will be shown in the results.

4.1 The Hypotheses of Study

To achieve the objective of this research five hypotheses have been expressed in the form of null hypotheses as follows:

H01: “There is no significant difference between the information that should be provided by the MAIS and the information needed for the BPR”.

H02: “There is no significant difference between the information provided by the TMAIS and the information needed for the purpose of BPR”.

H03: “There is no significant difference between the information provided by the SMAIS and the information needed for the purpose of BPR”.

H04: “There is no significant difference between the information provided by the AMAIS on the Egyptian companies and the information needed for the purpose of BPR”.

H05: “There is no significant difference between the information provided by the suggested MAIS and the information needed for the purpose of BPR”.

4.2 Sample Size and Data Collection

The study population includes companies working on engineering industry which are listed on the Egyptian stock market. These companies are facing more competition in both local and international levels which require more need for the re-engineering process compared to other industrial fields.

The sample size include the biggest 50 companies of the study population. The data needed to test hypotheses are collected through personal interviews and questionnaire that was distributed to management accountant, finance manager and production manager of all companies in the study sample. The questionnaires were distributed to 150 managers, 138 were received, and seven questionnaires was disregarded and 131 used in the analyses.

4.3 The Variables of the Study

For the purpose of testing the hypotheses and preparing the statistical analysis, the variables covered by this research are identified and measured as following:

1. Whether there are some motivations for the BPR. This variable is measured through Question No. X1 included in the questionnaire, which consists of several phrases that reflect this variable.

2. Whether the BPR requires managerial accounting information. This variable is measured through Question No. X2 included in the questionnaire, which consists of several phrases that reflect this variable.

3. Whether traditional management accounting information system provides enough information to BPR. This variable is measured through Question No. X3 included in the questionnaire, which consists of several phrases that reflect this variable.

4. Whether strategic management accounting information system provides the necessary information for the re-engineering process. This variable is measured through Question No. X4 included on the questionnaire, which consists of several phrases that reflect this variable.

5. Whether applied management accounting information system provides the necessary information for the re-engineering process. This variable is measured through Question No. X6 included on the questionnaire, which consists of several phrases that reflect this variable.

6. What certain considerations should be taken into account when the management accounting information system is designed for the purposes of re-engineering. This variable is measured through Question No. 5x which consists of several phrases, which reflect this variable.

5 Results

The followings are the results of testing the hypotheses:

5.1 First Hypothesis Results

This hypothesis tests whether the MAIS can provide the information needed for the BPR. So, it can be expressed as follows:

“BPR requires exceptional information, and the MAIS is the only system that is able to provide such information”

To test this hypothesis, it has been expressed in the form of null hypothesis as following:

“There is no significant difference between the information that should be provided by the MAIS and the information needed for the BPR”.

Table No. (2) shows the results of statistical analysis of this hypothesis.

Table 2: The significant differences between the information needed for the BPR and the information provided by MAIS (WT).

Statements	Average		Z Value	Level of significance
	Info. needed for the BPR	Info. should be provided by MAIS		
Whether MAIS provides sufficient information to BPR	4.258	4.294	0.018	0.986

-Level of significant < 0.05

According to the results in table (2), the difference between the information needed for the BPR and the information provided by MAIS is not significant, and then the null hypothesis will not be rejected, which means the information provided by MAIS do not differ from the information needed for BPR.

These results can be explained as follows:

-The recent developments in the managerial accounting to meet the challenges and changes in the business environment. These developments have rehabilitated MAIS which has become more open to other relevant work and more cooperation with other departments, especially the marketing department.

-The managerial accountant possesses the tools and techniques to design and manage the accounting information system in the company to meet the requirements of re-engineering process.

-The managerial accountant can unify the language of dialogue within the company and convince employees by the need for re-engineering process.

-The management accounting job is not only to analyze the data; it has evolved and become as analysis of decisions. The managerial accounting is no longer as reports preparing but it has become a business partner and an innovative tool.

The MAIS is qualified to provide the management with all information needed for the BPR.

5.2 Second Hypothesis Results

This hypothesis tests whether the TMAIS provides enough information to the BPR. So, it can be expressed as follows:

“The TMAIS does not provide the information needed for the purpose of BPR”

To test this hypothesis, it has been expressed in the form of null hypothesis as following:

“There is no significant difference between the information provided by the TMAIS and the information needed for the purpose of BPR”.

Table No. (3) shows the results of statistical analysis of this hypothesis.

Table 3: The significant differences between the information needed for the BPR and the information provided by TMAIS (WT).

Statements	Average		Z Value	Level of significance
	Info. needed for the BPR	Info. provided by TMAIS		
Whether TMAIS provides sufficient information to BPR	4.285	1.890	5.947	0.000

-Level of significant < 0.05

The results of statistical analysis in the table No. (3) shows the level of significance is (0.000) less than (0.05) which means that there are significant differences between the information needed for the BPR and the information provided by TMAIS. Therefore, we reject the null hypothesis and accept the alternative hypothesis that the TMAIS does not provide the information needed for the BPR.

These results can be explained as follows:

-TMAIS is not able to create future values through investment in customers, employees, technology and innovation and these are key considerations in the re-engineering process.

-TMAIS does not provide information from outside the organization regarding competitors and industry conditions which disable the managers of these companies to achieve the reference measurement as a stage or a key step in the re-engineering process.

-TMAIS focuses in providing information to perform tasks, and then does not support the re-engineering that requires the provision of information about the processes about the company operations.

-TMAIS does not provide information for strategic purposes associated with the process of re-engineering. For example, it does not care about the achievement of the overall quality, as it depends on the standard costs as the best tools to measure and control the cost and therefore cost management is not one of its goals, so it does not enable the managers of these companies to form the optimal mix of products and achieve optimal allocation of the resources of the company.

-TMAIS is interested only in measuring and evaluating financial performance as one dimension which would not be helpful to follow-up the re-engineered operations.

It is clear that there is a consensus between the theoretical analysis and the opinions of those in charge of companies with respect to the disability of traditional management

5.3 Third Hypothesis Results

This hypothesis tests whether the SMAIS provides enough information to the BPR. So, it can be expressed as follows:

“The SMAIS does not provide the information needed for the purpose of BPR”

To test this hypothesis, it has been expressed in the form of null hypothesis as following:

“There is no significant difference between the information provided by the SMAIS and the information needed for the purpose of BPR”

Table No. (4) below shows the results of statistical analysis of this hypothesis.

Table 4: The significant differences between the information needed for the BPR and the information provided by SMAIS (WT).

Statements	Average		Z Value	Level of significance
	Information needed for the BPR	Information provided by SMAIS		
Whether SMAIS provides sufficient information to BPR	4.258	3.143	0.022	0.484

-Level of significant < 0.05

The results of statistical analysis in the Table No. (4) shows the level of significant is (0.484) greater than (0.05) which means that there are no significant differences between the information needed for the BPR and the information

provided by SMAIS. Therefore, we do not reject the null hypothesis, however when we compare between the averages of information needed for BPR and information provided by SMAIS, we note that there is a big difference between them. So, we can conclude that SMAIS partially provides the information needed for the purpose of BPR.

These results can be explained as follows:

-SMAIS can create future values through investment in customers, employees, technology and innovation and these are key considerations in the re-engineering process.

-SMAIS provides information from outside the organization regarding competitors and industry conditions which enable the managers of these companies to achieve the reference measurement as a stage or a key step in the re-engineering process.

-SMAIS focuses in providing information about company operations, and then it supports the re-engineering.

-SMAIS provides information for strategic purposes associated with the process re-engineering. For example, It cares about the achievement of the overall quality, as it depends on cost management as one of its goals, so it enables the managers of these companies to form the optimal mix of products and achieve optimal allocation of the resources of the company.

-SMAIS is interested in measuring and evaluating the whole dimensions of performance which would be helpful to follow-up the re-engineered operations.

It is clear that there is a consensus between the theoretical analysis and the opinions of those in charge of companies with respect to the ability of strategic management accounting to support the re-engineering process.

5.4 Fourth Hypothesis Results

This aim of this hypothesis to identify whether the AMAIS in the Egyptian companies provides the necessary information needed for BPR. So, it can be expressed as follows:

“The AMAIS does not provide the information needed for the purpose of BPR”

To test this hypothesis, it has been expressed in the form of null hypothesis as following:

“There is no significant difference between the information provided by the AMAIS and the information needed for the purpose of BPR”.

Table No. (5) shows the results of statistical analysis of this hypothesis.

Table 5: The significant differences between the information needed for the BPR and the information provided by AMAIS (WT).

Statements	Average		Z Value	Level of sig.
	Info. needed for the BPR	Info. provided by AMAIS		
Whether AMAIS provides sufficient information to BPR	4.258	2.187	3.986	0.013

-Level of significant < 0.05

The results of statistical analysis in the table 5 shows the level of significance is (0.013) less than (0.05) which means that there is significant differences between the information needed for the BPR and the information provided by AMAIS. Therefore, we reject the null hypothesis and accept the alternative hypothesis that the AMAIS in the Egyptian companies does not provide the information needed for the purpose of BPR.

These results can be explained as follows:

-Most the Egyptian companies included in the study do not apply strategic managerial accounting information system but they are still using the traditional management accounting tools. Some of these companies do not have a definite vision for the future, long-term goals and even strategies for long-term.

-Some managers, through personal interviews, confirmed that the provision of information from outside the company related to competitors and industry conditions are gathered through other information systems marketing information system.

-Most companies still depend on the financial dimension only when measuring and assessing performance, so they cannot detect some of the processes that need re-engineering.

These companies need to develop their management accounting information system in place to take advantage of the strategic management accounting information system.

5.5 Fifth Hypothesis Results

The aim of this hypothesis is to test whether the suggested MAIS provides the necessary information needed for the BPR. To test this hypothesis, it has been expressed in the form of null hypothesis as follow:

“There is no significant difference between the information provided by the suggested MAIS and the information needed for the purpose of BPR”

This hypothesis has been tested using (WT) on two levels (each consideration is considered as single variable and all considerations as one variable) by comparing between the average recorded by responders and the average of five points Likert scale which is 3. The statistical results are shown in the following table No. 6.

Table 6: The significant differences between the participant’s opinions regarding the key considerations taken when designing MAIS for the BPR (WT).

Statements	Av.	St. Dev.	Z - Val.	L. of Sig.
- Compatibility between the objectives of the accounting system and the objectives of the management regarding BPR.	4.30	0.833	5.496	0.000
- Provide greater participation when designing accounting system for users in BPR.	4.62	0.491	6.190	0.000
- Development of the accounting system tools to cope with internal and external environment of the organization.	4.15	0.722	5.613	0.000
- Consider the values, beliefs and cultures prevailing in the organization during the re-engineering process.	4.15	0.780	5.457	0.000
- The accounting system contributes to the allocation of resources within the organization to serve the re-engineering process	4.06	0.763	5.391	0.000
- Development of the accounting system database to serve the re-engineering process.	4.32	0.755	5.689	0.000
- Accounting reports reflect the nature of the organizational structure and management style during the re-engineering process	4.43	0.617	5.960	0.000
- Relate the accounting reports with incentive systems applied in the organization.	4.04	0.751	5.341	0.000
- The reports and tools of accounting system to reflect the areas of re-engineering and justifications for this process.	3.96	0.751	5.304	0.000
- The accounting system provides quantitative information (financial and non-financial) as well as descriptive information.	4.38	0.739	5.775	0.000
- Development of the accounting system as decision support system in the organization.	4.26	0.675	5.763	0.000
- The key considerations taken when designing MAIS for the BPR.	4.24	0.233	5.990	0.000

-Level of significant < 0.05

The results of statistical analysis in the previous table shows the level of significance in both partial (each statement) and total levels are (0.000) less than (0.05) which means the null hypothesis is rejected and the alternative hypothesis that the suggested managerial accounting information system provides the necessary information needed for the BPR will be accepted. These results can be explained as follows:

-The compatibility between the objectives of the managerial accounting information system and the objectives of the management regarding BPR would provide all levels of management with accounting reports needed during the stages BPR.

-The involvement of the users of these reports in the design of accounting system maximizes shared considerations between the accountant and the users of these reports.

-The development of database for the re-engineering is reflected positively on the output of the managerial accounting information system for the purposes of BPR. In this case, the reports include indicators on the performance of competitors and industry conditions with operational performance indicators within the company, which provide

objective evidence about the need to re-engineering process.

-The identification of the BPR progress and the achieved results by the company through these reports is reflected on increasing the number of supporters of this process and trust the way of doing such process.

-The compatibility between the accounting reports, the organizational structure and management style, and considering the values, beliefs and cultures prevailing in the company, will lead to the acceptance and support for BPR, and disseminate the culture of re-engineering within the company.

In summary, there is a number of considerations that should be taken into account when the managerial accounting information system is designed for the purposes of re-engineering. Furthermore, there is agreement between the finding of field study and the analytical study derived from the literature in this regard.

6 Conclusions and Recommendations

The main objective of this research is to identify the role of managerial accounting information system in business process re-engineering. To achieve this objective, an analytical field study is conducted. The analytical study includes the BPR concepts, goals, motives and steps; the information needed for BPR; the extent to which the traditional, strategic and applied managerial accounting information system provide the information needed in

conducting BPR. It also includes the suggested framework of MAIS for the purpose of BPR. The field study conducted through personal interviews and questionnaires to test the hypotheses. The questionnaire is polled to managerial accountants, finance directors and production directors in a sample of companies engaged in the engineering industry and listed the Egyptian stock market about the role of managerial accounting information system BPR.

The most important findings of this research that there are several factors in the modern business environment which pushes the organizations to conduct the BPR, such as the accelerated developments in production and information technology, severe competition on both domestic and international, customer care; the BPR requires information in several areas which should be provided by the managerial accounting information system. The traditional management accounting is not capable of fulfilling its role in the completion of re-engineering process, which is a vital requirement for most organizations to take advantage of the modern era. Strategic management accounting provides valued information about customers, competitors which help the organization to perform the SWOT analysis and determine strengths, weaknesses, opportunities and threats. However, the BPR requires some more information which is not provided by strategic management accounting. The applied management accounting information systems in the Egyptian companies do not provide the necessary information needed for BPR. There is a number of considerations that should be taken into account when the managerial accounting information system is designed for the purposes of re-engineering. Furthermore, there is an agreement between the finding of field study and the analytical study derived from the literature in this regard.

Based on the previous results, some recommendations should be considered for future research. One of these studies is to identify the relevance of benchmarking to determine the need for BPR. Another study is done regarding the role of managerial accounting information system in changing the values, beliefs and culture of the organizations. Also, the qualification of managerial accountant in the modern business environment should be considered.

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