



**SUDAN UNIVERSITY OF SCIENCE &
TECHNOLOGY
COLLEGE OF GRADUATE STUDIES**

**The Effect of Integration of Resource Consumption
Accounting and Total Quality on Strategic Cost Management
in Sudanese Food Industrial Companies**

**أثر التكامل بين محاسبة إستهلاك الموارد والجودة الشاملة على الإدارة الإستراتيجية
للتكلفة فى شركات الصناعات الغذائية السودانية**

**Thesis Submitted for the Award of the Degree of Doctor of Philosophy
in Cost and Management Accounting**

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قال تعالى

(يا أَيُّهَا الَّذِينَ آمَنُوا إِذَا قِيلَ لَكُمْ تَفَسَّحُوا فِي الْمَجَالِسِ فَافْسَحُوا يَفْسَحِ اللَّهُ لَكُمْ ۗ وَإِذَا قِيلَ انشُرُوا فَانشُرُوا يَرْفَعِ اللَّهُ الَّذِينَ آمَنُوا مِنْكُمْ وَالَّذِينَ أُوتُوا الْعِلْمَ دَرَجَاتٍ ۗ وَاللَّهُ بِمَا تَعْمَلُونَ خَبِيرٌ) (11)

(سورة المجادلة: الآية 11)

DEDICATION

I dedicate this work to:

My mother who none of it would be happening if it weren't for her

My family the most precious thing I have.

My dearest friend who has been there every step of the way for me

To all my friends and colleagues

Acknowledgment

Thanks to God first and foremost for everything. I am thankful to Sudan University of sciences & Technology. I am especially thankful for the mentorship of my supervisor **Dr Babiker Ibrahim Elsidig...**

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ABSTRACT

Sudanese products suffer from high cost, despite their poor quality in comparison to international products which weakens their competitiveness. This was what the literature review had revealed. Hence, the problem of the study was, there is a deficiency in the traditional costing systems applied by most Sudanese industrial companies, which makes them unable to manage their costs effectively. The main aim of this study was to examine the effect of integration between the Resource Consumption Accounting and Total Quality Practices on Strategic Cost Management, accordingly, the study hypothesized a positive effect of the integration between resource consumption accounting and total quality practices on strategic cost management. To achieve the objectives of the study, the study adopted descriptive analytical approach. The population of this study was food industries firms operating in Khartoum – Sudan, non-probability sampling was employed and the response rate was (87%) of the distributed questionnaires. The hypotheses tested by using the path analysis through using AMOS in Structural Equation Modeling. The Findings of the study indicated that the integration of resource consumption accounting and total quality practices is found to be significant in relation to strategic cost management. However Sudanese food industry companies, apply traditional systems (78.1%) which affect the confidence in accounting information, and can create tremendous problems within an organization. This study reveals there is lack of interest of the vast majority of food industry companies about costs information and managerial accounting, moreover most of them do not have a separate division of costs and they don't separate the accounting system from the cost system, and relying mainly on the financial accounting system only as an accounting information and data system. The study recommends that there is a need to develop the cost systems currently used for its inability to provide accurate information and replace them with modern systems that keep up with development and suit the Sudanese industrial environment.

مستخلص الدراسة

إن المنتجات السودانية تعاني من إرتفاع التكلفة، على الرغم من ضعف جودتها مقارنة بالمنتجات الدولية مما يضعف قدرتها التنافسية. هذا ما كشفت عنه مراجعة الأدبيات، بالتالي، تمثلت مشكلة الدراسة في وجود قصور في أنظمة التكاليف التقليدية التي تطبقها معظم الشركات الصناعية السودانية، مما يجعلها غير قادرة على إدارة تكاليفها بفعالية. الهدف الرئيسي هو دراسة تأثير التكامل بين محاسبة استهلاك الموارد وممارسات الجودة الشاملة على إدارة التكلفة الإستراتيجية، بالتالي إفتترضت الدراسة تأثير إيجابي للتكامل بين محاسبة استهلاك الموارد وممارسات الجودة الشاملة على إدارة التكلفة الإستراتيجية. ولتحقيق أهداف الدراسة، اعتمدت الدراسة المنهج الوصفي التحليلي. تمثل مجتمع الدراسة في شركات الصناعات الغذائية العاملة بالخرطوم، وتم استخدام عينة غير إحصائية وكان معدل الإستجابة (87%) من الإستبانات الموزعة. الفرضيات تم إختبارها بإستخدام تحليل المسار من خلال استخدام برنامج AMOS في نمذجة المعادلات الهيكلية. أشارت نتائج الدراسة إلى أن تكامل محاسبة إستهلاك الموارد وممارسات الجودة الشاملة يؤثر إيجابياً على الإدارة الإستراتيجية للتكلفة. لكن معظم شركات الصناعات الغذائية السودانية تطبق الأنظمة التقليدية (78.1%) مما يؤثر على الثقة في المعلومات المحاسبية، ويمكن أن يخلق مشاكل هائلة داخل المؤسسة. تكشف هذه الدراسة عن عدم إهتمام الغالبية العظمى من شركات الصناعات الغذائية بمعلومات التكاليف والمحاسبة الإدارية، علاوة على أن معظمها ليس لديها قسم منفصل للتكاليف ولا تفصل بين نظام المحاسبة المالية ونظام التكاليف، ويتم الإعتماد بشكل رئيسي على نظام المحاسبة المالية فقط كنظام للمعلومات المحاسبية. توصي الدراسة بضرورة تطوير أنظمة التكلفة المستخدمة حالياً لعدم قدرتها على توفير معلومات دقيقة وإستبدالها بأنظمة حديثة تواكب التطور وتناسب البيئة الصناعية السودانية.

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List of Abbreviations

RCA	Resource Consumption Accounting
TQ	Total Quality
CoQ	Cost of Quality
SCM	Strategic Cost Management
ABC	Activity Based Costing
GPK	German Cost Accounting (Grenz plan kostenrechnung)
AMOS	Analysis of a Moment Structures
EFA	Exploratory factor analysis
CFA	Confirmatory factor analysis
SEM	Structural equation modeling

Chapter one

Introduction

Section One

Introduction

1.0 Introduction

The world has seen over the last decade drastic changes in the fields of politics, economics and technology. The modern Industry sector environment has changed in a short time, and Industry technology has advanced. So in such a changing world, the institution's effectiveness depends greatly on the competitiveness among institutions. So such business bodies will be in front of many great challenges in taking a difficult decision so as to achieve their goals.

In competitive environments, managers should make a fundamental decision concerning their organization's goal for positioning itself in comparison to competitors. Undoubtedly, information about costs is very important. There are pressures on managers about costs which comes from internal needs such as make more profits, to increase the value for stakeholders, and many external quarters, including shifting customer priorities, the emergence of new competitors and channels, and increasingly inquisitive financial markets. Therefore, Entities are forced to seek effective methods to manage their competitive advantage, financial and non-financial performance. Competitive strategy oriented to external context, effective organizational structure and strategic cost management (SCM) information allows companies to strive to succeed. Assurance of competitive advantage is based on the decision-making process of managers by using SCM information. (Darius, Rasa, 2015) Cost management information is the information the management needs to effectively manage the firm and includes both financial information about cost and revenues as well as relevant non-financial information about productivity, quality and other key success factors for the firm to lead the firm to competitive success. In cost management, the objective is to increase productivity of resources and factors of production and to relate them to enhance profitability. It continuously looks for and identifies opportunities to have higher return on investment by studying customer needs, bringing improvement in the existing products or services, smoothening process and layout of manufacturing goods or services with a view to supply them to the customers and to ensure customer satisfaction so as to maximize margins and earn higher profits (Jawahar, 2015)

Strategic cost management tools could help with this issue by providing important information for strategy formulation, evaluation of strategy implementation, and highlighting the practical limitations or problems with the adopted strategy (Atulya, 2006).

1.1 The statement of the problem

Globalization and high competition have compelled the accounting data system to change, and change the company's systems as a whole. Traditional accounting systems remain insufficient and the managers cannot provide the necessary information for making decisions which indicates that management accounting has failed to do its job well as stated in (Younes, Heba, 2013), which has led to the search for new methods. Since Johnson and Kaplan published "Relevance Lost – The Rise and Fall of Management Accounting" in 1987, Activity-Based Costing (ABC) has been recognized as a means to obtain more accurate and relevant information of product cost. It began to attract a widespread interest amongst both researchers and practitioners as was mentioned in study of (Arikan Taric, Cevdet Alptekin, 2015). As (Devinaga Rasiyah, 2011) refers that, although traditional cost systems are deficient, they are still used in most industrial firms, this may be due to ABC systems couldn't replace them, in this study the results indicated that most operations managers believed that their present cost systems were adequate for decision making. In another study (Nitza Geri, Boaz Ronen, 2005) the results showed that the ABC system failed to live up to its promise and not many companies retained it beyond a short pilot period. Study of (Ulf Fryklund, Linkai Zhang, 2000) refers to that the accuracy of cost information after applying ABC has not been improved. (Michael, Maleen, 2009) mentions that despite its theoretical superiority over traditional volume-based costing models, the ABC model has failed to replace it in most organizations. Therefore, a new system has emerged, which is Resource Consumption Accounting (RCA), to solve the problem of traditional systems and the cost of activities as mentions by (David Perkins, O. Scott Stovall, 2011).

Regarding the changes in quality, organizations have gone beyond the debate of whether quality is more expensive or more useful. Quality has become a fundamental requirement so that the company can have a share in the market (Ahmed Hussein, 2013). Now the debate about total quality management (TQM) and whether its cost is more than its benefit or vice versa. TQM system is structured to meet the internal and external needs of customers and suppliers by integrating them with the company and

improving the business climate. The opportunity for innovation as well as development, and improving business processes and culture (Elizabeta, Elenior, Biljana, 2016).

The problem is that Sudanese products suffer from high cost, despite their poor quality in comparison to international products which weakens their competitiveness, as was mentioned in study of (Mustafa, Mohamed, 2010) that the majority of the industrial products has not succeeded in finding a place in the world markets because of the lack of changing global requirements in terms of quality and prices. Hence, there is a deficiency in the traditional costing systems applied by most Sudanese industrial companies, which makes them unable to manage their costs effectively.

This problem can be expressed by the following questions:

- Is there a relationship between the application of resource consumption accounting and strategic cost management?
- Does the application of TQ practices effect strategic cost management?
- Can the integration between resource consumption accounting and total quality practices effect on strategic cost management?

1.2 The objectives of the study

- To study resource consumption accounting and find out the effect of it on strategic cost management.
- To learn about the application of TQ practices and the effect of it on strategic cost management.
- To study the effect of the integration between Resource Consumption Accounting and Total Quality practices on Strategic Cost Management.

1.3 The significant of the study

The theoretical Significant: Is represented in that the methods of strategic cost management are always in a state of continuous development. This research attempts to link between two methods to achieve SCM in the way that fits the developments and complexities that accompanied the technological progress and the economic developments. This study is one of the attempts to find suitable methods for the fierce competition and developments facing the industrial companies in a modest attempt to enrich

library scientific research as a contribution to researchers and a guide for further research in this field.

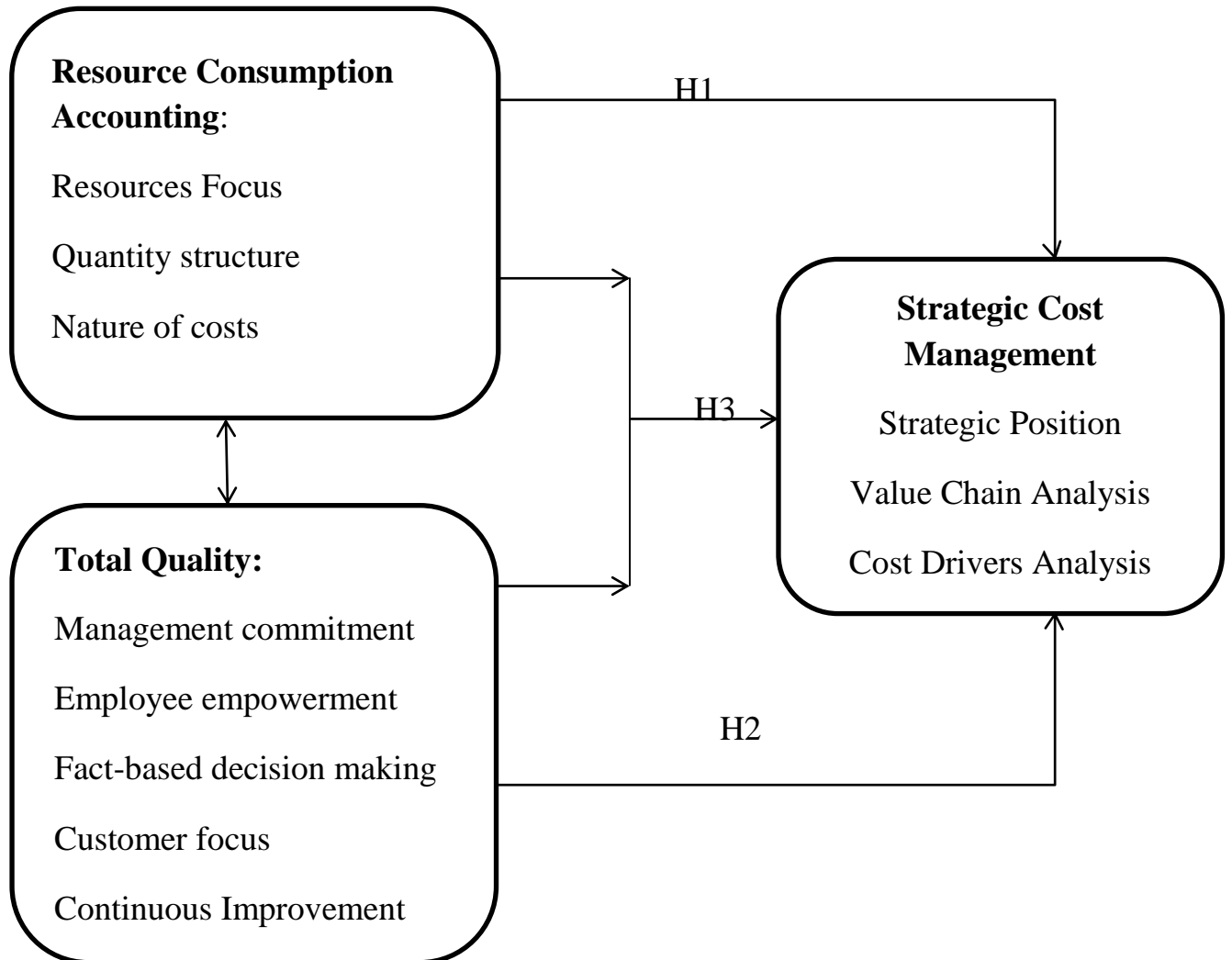
The practical Significant: Is represented in that industrial companies in Sudan still use traditional accounting system which is considered inappropriate and creating an urgent need for developing the cost management system so that the industrial companies can compete in a modern industrial environment.

1.4 The hypotheses of the study

To answer the study questions, achieve its objectives: the following hypotheses were developed:

- There is a statistically significant relationship between the application of resource consumption accounting and strategic cost management.
 - There is a statistically significant relationship between application of resource consumption accounting and Value chain.
 - There is a statistically significant relationship between application of resource consumption accounting and Cost Driver.
 - There is a statistically significant relationship between application of resource consumption accounting and Strategic Positioning.
- There is a statistically significant relationship between application of Total Quality practices and strategic cost management.
 - There is a statistically significant relationship between the application of TQ practices and Value chain.
 - There is a statistically significant relationship between the application of TQ practices and Cost Driver.
 - There is a statistically significant relationship between the application of TQ practices and Strategic Positioning.
- There is a positive relationship between the integration of Total Quality and resource consumption accounting on strategic cost management.

1.5 Model of the study:



Source: prepared By Researcher

1.6 The limitations of the study:

The field study is conducted during 2018 covering a sample of Sudanese food industrial company in Khartoum state.

1.7 The methodology of the study:

For the purpose of collection and analysis of the data, the researcher used the descriptive analytical method, which is interested in studying the phenomenon as it exists in reality and describe it accurately with the collection of information on the elements of the study and interpretation

and analysis using appropriate statistical methods. The researcher used the questionnaire as a tool for collecting primary data, and using statistical methods to analyze the results of the field study.

1.8 Data Collection Sources:

The study depends on two types of sources for data; primary data and secondary data. Primary data which consists of all data related to variables identified in this study was collected via questionnaire. Secondary data which includes all data collected from references, books, periodicals, published thesis, dissertations, reports and international scientific conferences.

1.9 The structure of the study:

This research lies in five chapters. The characteristic and main contents of chapter one presented the thesis Introduction which consists of two sections, the first section introduction, and the second section previous studies. Chapter two describes the cost accounting systems which includes two sections, section one provides an overview of traditional costing systems, section two reviews resource consumption accounting. Chapter three addresses the Total Quality Management and consists of two sections; the first section represents the total quality management, the second section is about cost of quality. Chapter four represents the strategic cost management and contains two sections, the first section provides an overview and basic concepts of strategic cost management, and the second section explains the strategic cost management techniques. Chapter five covers the field study.

Section Two

Previous Studies

The study dealt with a number of previous studies related to the Resource Consumption Accounting, Total Quality and Strategic Cost Management as follows:

Study of Keys, A. van der (2001)¹:

A mapping resource consumption accounting (RCA) method, which analyzes and manages the resource side of activity-based costing (ABC), was discussed. The resource elements are associated in a resource pool with an output measure that serves as the measure of capacity. RCA complements the ABC model by incorporating the visible homogeneous measures of capacity that directly expresses the interrelationships between resources, reflecting the initial inherent nature of cost, and accounting for excess and idle capacity.

Resource consumption accounting, when used in tandem with ABC, resolves the first four shortfalls. Resource elements are associated in a resource pool with an output measure that serves as the measure of capacity. The initial inherent nature of cost is reflected by primary expense elements. Fixed and proportional unit cost rates are used to charge consumers of resources. In accounting for excess capacity, the approach is superior in focusing attention on idle resources, accurately accounting for excess capacity, and providing detailed decision support information. A disadvantage of this approach is increased complexity. C.S. Lewis said “Reality is more complex than fiction”—this will be borne out as management accounting systems strive to more accurately reflect the real world with its capacities, activities, in activities, and related costs.

This is the first article written about resource consumption accounting. The focus was on the ABC system flaws and how RCA system can assist in updating this system. This study is different in that the objective is to study the effect of resource consumption accounting on strategic cost management.

Study of Keys, A. van der (2002)¹:

¹ Keys, D. E., A. van der Merwe, The case for RCA: Excess and idle capacity, Cost Management, VOL. 15, NO. 4, 2001.

According to Keys and van der Merwe, resource consumption accounting (RCA) is a control solution with a focus on actual versus predicted results that will surpass ABC/ABM. They state that ABC/ABM based on the CAM-I cross, while somewhat effective, has several shortcomings. The main problem is that the focus of ABC/ABM is too narrow in that these methods ignore the various levels of management and the layers or tiers within those levels. RCA, on the other hand is based on a cube that recognizes all these levels and layers within the organization. RCA has very detailed and broad variance analysis capabilities, that supports analysis at each planning and control tier. First, it allows for both input side and output side variance analysis by using a debit and credit method. A variance in the input side may be treated as a credit to input and a debit to output. Second, RCA allows for the classification of controllable versus uncontrollable variances. For example, quantity used is controllable while price may not be controllable. Also the same item may be controllable in one tier but uncontrollable in another tier. Finally, the authors emphasize the need for learning and an understanding of the system by everyone involved. There must be accountability from everyone in the company based on an accurate determination of responsibility for variances, particularly related to excess or idle capacity. RCA is not only a method of defining and finding variances, but a tool for investigation and corrective action with a focus on control and organizational learning.

The above study focus on resource consumption accounting as a system for effective organizational control while this study focuses on this system as a tool for strategic cost management

Study of Sally Webber, B. Douglas Clinton (2004)²:

The main purpose of the Clopay Plastic Products Company case study was to examine the changes in cost assignment and the ensuing benefits of implementing relevant RCA principles in one factory of a larger manufacturing company. The company studied the application of Clopay, where it studied the status of the company before and after the application of resource consumption accounting. Resource consumption rates developed during the case study used German-based Grenzplankostenrechnung (GPK) cost assignment logic, an integral component of RCA. One of the results,

¹ Keys, D. E., A. van der Merwe, Gaining effective organizational control with RCA, Strategic Finance, 2002. <http://maaw.info/ArticleSummaries/ArtSumKeysVanderMerwe02.htm>

² Sally Webber, B. Douglas Clinton, Resource Consumption Accounting Applied: The Clopay Case, Management Accounting Quarterly, VOL. 6, NO. 1, 2004.

when compared RCA with Clopay's traditional standard costing system, RCA provides significantly more reliable cost information to support decision making. This is evident in several areas. They conclude that RCA's treatment of proportional and fixed cost translates to increased accuracy in product cost assignment. Moreover, increased cost accuracy provides managers a better understanding of resource consumption patterns. And resource-level considerations are important to decisions that rely on the underlying cost data generated from a company's system. Although they did not elaborate on the planning function, they thought it also is important managers must understand that resource planning will be impeded without the ability to simulate relevant cost results. Consequently, RCA provides increased relevance in cost simulations and performance measurement.

The above study was a case study of the Clopay Plastic Products Company, which it studied the status of the company before and after the application of resource consumption accounting. While this study is a descriptive analytical study for the effect of resource consumption accounting on strategic cost management.

Stud of Carmen Necule 2009¹:

TQM is a management approach with great potential, which incites to new and deeper analysis and research. Multiple analyses of the techniques, methods and TQM require expansion and accounting solutions. The application presented is a model for tracking quality costs in terms of applying TQM. Tracking quality costs using ABC is the solution obtained after a thorough analysis of TQM and ABC method. For relevance solution, they chose the solution in an enterprise application. The material presented is a step in the successful implementation of TQM using the method of analysis of quality costs ABC method. The focus on cost, quality and period of time, has generated more change management with important implications in Managerial Accounting. These changes include increasing the strategic management initiatives, such as activity-based costing (ABC) and Total Quality Management (TQM). The conclusion shows that the ABC method complements TQM providing quantitative data on improvements made as part of TQM. Managers can use information gathered by ABC analysis, Pareto analysis leading to the cost drivers' analysis of key cost, an important ingredient in most TQM initiatives. Model is a test in addition to the successful implementation of TQM.

¹ Carmen Necule, Arguments for use of ABC in TQM environment, The Bucharest Academy of Economic Studies, Romania, 2009.

The above-mentioned study presented a model for tracking quality costs in terms of applying TQM using ABC, while this study presented the effect of the integration of total quality and resource consumption accounting on strategic cost management.

Study of Michael S., Maleen 2009¹:

This study presented a discussion on implications of recognizing idle resources in TDABC and RCA models on developments, maintenance and uses of cost management systems. A hypothetical case is presented to illustrate conversions of an ABC-based costing model to ones that are based on the TDABC and RCA models, and the resulting new allocation of resource costs. According to the findings The TDABC and RCA models represent two different philosophies on the development of cost management systems. The TDABC model is specifically designed to simplify implementation and maintenance of cost management systems through usages of single measure of resources capacity and quantity-based resource-activity cost drivers in the model. In contrast, the RCA model attempts to capture complexities of contemporary manufacturing activities by recognizing complex inter-relationships between resource pools and cost objects and relies on integration with ERP system to manage complexities of the model. It is more suitable to manufacturing organizations that employ multiple heterogeneous resources in their operations.

The above-mentioned study took Time-Driven Activity-Based Costing (TDABC) and Resource Consumption Accounting (RCA) models as costing models for next generation cost management systems. Whereas this study took Resource consumption accounting and total quality to achieve strategic cost management.

Study of Yanhui Wang 2009²:

This study discussed the applicability of RCA in the college education cost Accounting in this study, and simply narrated the application approaches of RCA and the problems in the application that should be concerned by us.

¹ Michael S. C., Maleen Gong, Recognition of Idle Resources in Time-Driven Activity-Based Costing and Resource Consumption Accounting Models, Journal of Applied Management Accounting Research, Vol. 7, NO 2, 2009.

² Yanhui Wang, et al., Study on the Application of RCA in College Education Cost Accounting, Northeastern University, China, International Journal of Business and Management, Vol. 4, No. 5, May, 2009.

The study conclusion was as new accounting method; RCA combines the theoretical advantages of ABC and the practical advantages of GPK, and offers better solution of the cost accounting and management. It is not only a sort of theoretical innovation, and its practical meaning should be more emphasized. The application of RCA in college education cost accounting can be more exactly account the indirect cost of college, and RCA could adapt to the characteristics of college such as numerous “product” sorts and complex “production and management” activity, and fulfill the multi-layered demands of financial information for college, and offer a wider road for the college accounting. Though the application is still in the experiment stage, but because of the advantages of RCA, it will certain acquire abundant results for the college education cost accounting.

The above-mentioned study discussed the applicability of RCA in the college education cost accounting. It differs from this study in the application, this study examined the effect of the resource consumption accounting and total quality on Industrial sector.

Stud of Dinh, Barbara, Tritos 2010¹:

This paper presents a comparative study on the relationship between implementing total quality management (TQM) and organizational characteristics (size, type of industry, type of ownership, and degree of innovation) in a newly industrialized country in South East Asia. Thus, the purpose of this study is to investigate the relationship between the firm’s organizational characteristics and TQM implementation in Vietnamese companies. Two research questions are explored: a) Can TQM strategy is considered as a set of practices? b) Are there any differences in implementing TQM between companies according to size, ownership, type of industry, and degree of innovation (measured by the number of new products and services)?

The results show a clear difference in TQM practices by company size, industry type, and degree of innovation. Large companies had higher implementation levels across almost all practices except for teamwork and open organization when compared to small- and medium-sized companies. TQM practices were statistically more significant in manufacturing companies compared to service companies, and firms having a higher degree of innovation also showed higher levels of TQM practice implementation. In

¹ Dinh Thai Hoanga, Barbara Igelb, Tritos Laosirihongthong, Total quality management (TQM) strategy and organizational characteristics: Evidence from a recent WTO member, Total Quality Management, Vol. 21, No. 9, 2010.

particular, the low deployment of TQM practices in service industries, where TQM has been considered as order qualifier, highlights the challenges for Vietnam's service industries that pursue TQM to successfully compete in the global marketplace.

The above-mentioned study investigated the relationship between the firm's organizational characteristics and TQM implementation, whilst this study examined the effect of the integration of total quality and resource consumption accounting on strategic cost management.

Study of David Perkins 2011¹:

This study illustrates the distinguishing features of RCA, ABC, and TOC as compared to the traditional costing approach (as a benchmark) and attempts to offer some basic guidance as to when each system may be appropriate.

As a practical matter, maintaining multiple costing systems may not be feasible or desirable; however, understanding the conceptual benefits of different approaches may encourage management to make adaptations to an existing system to accommodate various decision contexts. When the appropriate technological environment and managerial expertise are available, the RCA would seem to accommodate all time horizons noted above. RCA's division of proportional and fixed costs can provide support for short-range marginal decisions and RCA's insights to resource capacities can support long-term decisions that impact and/or rely on capacity requirements.

In a simple production environment, the information provided by one of the more sophisticated approaches may not be justified from a cost/benefit perspective. As environmental complexity increases, however, the information that RCA or ABC provides concerning the "causes" of costs in production processes (i.e. the activities that drive costs) may enhance a firm's ability to manage the demand for those cost-driving activities. In addition, the effort required by RCA to classify costs in terms of behavior (fixed vs. proportional) potentially allows management to isolate the costs of idle capacity and apply flexible budgeting techniques at various levels within the organization or production process. On the other hand, the in-depth analysis and complexity associated with RCA may hinder its desirability and wide-spread adoption.

¹ David Perkins, O. Scott Stovall, Resource Consumption Accounting – Where Does It Fit?, Abilene Christian University, USA, The Journal of Applied Business Research – September/October 2011, Volume 27, Number 5.

The above-mentioned study illustrates the distinguishing features of RCA, ABC, and TOC as compared to the traditional costing approach, while this study examined the effect of the resource consumption accounting and total quality on strategic cost management.

Stud of Fazli Idris 2011¹:

This paper investigates the relationship between Total Quality management (TQM) elements and sustainable company performances. TQM models prescribe several important factors: starting with effective leadership that executes brilliant strategies, emphasizing best practices in quality improvements while recognizing the stakeholders' needs. This research employs TQM as the research framework while also taking into consideration the resource-based views (RBV) on the arguments concerning internal capabilities. An instrument is developed to measure the related TQM constructs and is found to be reliable. Using exploratory factor analysis, it is found that the items clearly fall into six factors: leadership, best practices, customer focus, employee focus, community focus and productivity focus. Another factor analysis on measures of company sustainable performance has resulted in a single factor. The study proceeds with the multiple regression analysis to test the relationship between the dependent, sustainable company performances and the independent factors, the dimensions of TQM. This paper is in support of the fact that TQM dimensions bring some repercussions on a company's performance. The relationship between the elements of leadership, best practices, productivity, customer, employee and community focus and company performances is significantly proven. This study employs the resource-based view and TQM related excellence model criteria that are used as a theoretical framework.

The above-mentioned study investigated the relationship between Total Quality management (TQM) elements and sustainable company performances, whilst this study investigated the relationship between the integration of total quality and resource consumption accounting and strategic cost management.

Stud of Shenghua, Dong 2011²:

¹ Fazli Idris, Total Quality Management (TQM) and Sustainable Company Performances: Examining the Relationship in Malaysian FIRMS, International Journal of Business and Society, Vol. 12 No. 1, 2011.

² Shenghua QIN, Dong YAN, The Application of Resource Consumption Accounting in Cost Management of Manufacturing Engineering Project, Advanced Materials Research, Vol. 323, 2011.

In this study the researcher attempted to use the idea of RCA in project cost management. The problem of the study was the engineering project's cost is the whole consuming that from the project planning and design to the final account. Under enterprise's general goals and engineering project's specific request, the cost management of engineering project is effective organization, implementation, control, track, analysis and inspection to engineering project cost, then to strengthen its management and operation, to raise the cost accounting level, reduce the project cost, realize the target, increase the enterprise value. Along with the more intense competition, to survive and develop, under the guarantee of construction quality, the construction enterprises is compelled to launch the intense price war, sometimes even does not hesitate to be lower than the project cost bid price, even if is selected, the profit space is also very limited. Therefore, the construction enterprise must practice "the internal strength", strengthens the cost management. The study concludes that the application of resource consumption accounting in project cost management can refine the cost management processes, such as the identification and management of E / I capacity, and can adjust budget flexibly according to the actual situation, and make the decision-making more perfect.

The above-mentioned study examined the application of resource consumption accounting in project cost management, while this study examined the effect of the resource consumption accounting and total quality on strategic cost management in food industry sector.

Study of Syed Ajaz Ahmed 2011¹:

This study introduces "Resource Consumption Accounting - (RCA)" and its application in educational institutes/ universities. This study developed a cost model for application in educational institutes. Educational institutions/ universities serve the manpower requirement of the economy Units operating in various sectors of the economy whom are the clients of educational institutions. It is, therefore, the responsibility of the educational institutions to produce and supply competent, hardworking, knowledgeable and competitive manpower within their available resources. An educational institute consists of several departments. Some of them are synonymous to production departments in a manufacturing concern and are directly involved in the educational process and we may call them talent cultivation departments, while others are service departments which assist production

¹ Syed Ajaz Ahmed, Mehboob Moosa, Application of Resource Consumption Accounting (RCA) in an Educational Institute, Pakistan Business Review, PAKISTAN, 2011.

departments in carrying out their operations smoothly. The environment in which an educational institute operates is increasingly dynamic and complicated and as a result, it needs a proper cost management system for strategic planning and decision making. The three components; productive capability, competitive strategy and enterprise optimization create greater success in the highly competitive market place. An educational institute needs to have an adequate cost management system to achieve the following objectives: Finding the precise education cost per student in each program and cost of the program, Generating information and reports for various tiers of management, measuring the operating efficiencies of production and service departments and various cost centers within these departments, Tracing those areas where resources remain idle, unutilized or wasted, Implementing the budgetary control process in the organization for proper planning, coordination and control.

The above-mentioned study introduces Resource Consumption Accounting - (RCA) and its application in educational institutes/ universities, while this study examined the effect of the resource consumption accounting on strategic cost management in food industry sector.

Study of Jihad Rebahe (2013)¹:

The purpose of this study is to use the resource consumption accounting model to calculate resource costs, determine idle capacity and eliminate it from the cost of the product, thus rationalizing the cost of the final product. The researcher used the inductive approach and found the following results; RCA is suitable for industrial organizations that employ multiple heterogeneous resources in their operations, continuous customer satisfaction and attention to complaints and suggestions increases the exploitation of available resources and thus reduces waste, The success of the new model is linked to the efficient and effective delivery of its integrated information systems that provide an important base for both financial and non-financial data. The study recommended that companies should adopt quality systems that increase the amount of energy utilized in all resources, leading to cost management, applying modern methods in the advanced manufacturing environment to provide competitiveness.

¹ Jihad Rebahe Al-Natou, The impact of applying the resource consumption accounting model to cost management in the Jordanian industrial companies, Journal of Accounting Thought, Ain Shams University, Faculty of Commerce, Cairo, VOL. 3, 2013.

The above-mentioned study took the impact of applying the resource consumption accounting model to cost management, while this study examined the effect of the resource consumption accounting and total quality on strategic cost management.

Stud of Md. Abdus Sabur 2013¹:

The problem of this study was many companies believe that costs of the introduction of TQM are far greater than the benefits it will produce. The major objectives of the study are high light the various uses of Total Quality Management (TQM) as a tool for managerial making. Another object is to find out the inherent constraints in its application followed by an attempt to recommend for the betterment of the situation. The results showed that TQM attempts to have maximum customer satisfaction through providing quality products and services but the uncongenial business environment, a high cost of production, increasing prices of products unfair competition in the market are the major constraints in using TQM. Once the business is profitable, they can develop quality products and services. The absence of a breakeven point decline in demand for products, lack of trained manpower are other limiting factors for such use. The researcher thinks we should try to have market research to satisfy our customers as well as managerial efficiency and effectiveness side by side. We should also develop strategic management techniques to stand in an open market economy. Once the strategies are appropriate business can see well and further enhance the wide area of TQM devices towards the customer's goals achievement.

The above-mentioned study aimed to explain the various uses of Total Quality Management (TQM) as a tool for making management, while this study aimed to show the relationship between Total Quality and strategic cost management.

Study of Mohammed Omer 2013²:

This study aimed to demonstrate the possibility of Resource Consumption accounting approach as one of the alternatives to develop cost systems and in response to changes in modern environment for helping in rationalize and manage resources for Services Business Firms, where it has been proposed a framework for RCA approach can be applicable in Services Business Firms.

¹ Md. Abdus Sabur, Total Quality Management as a Tool for Decision Making, Asian Business Review, Volume 3, Number 4, 2013.

² Mohammed Omer, Development of cost systems in service facilities using accounting Resource consumption in order to rationalize resource management, Tanta University, Egypt, 2013.

This study found many of the results, the most important: 1- The cost accounting systems is one of the main pillars to ensuring the stability of the financial system of Services Business Firms because of its role to provide management and decision-makers with financial and non-financial information to enable them to make strategic decisions. 2- The success of the Services Business Firms is measured largely with achieve profits through the rational use of resources and try to take advantage of the available capacity and reduce costs for the provision of services, and this can be achieved through the resource consumption accounting approach. 3- The resource consumption accounting approach contributes in the solving of the problems facing both the traditional cost accounting systems and activity based costing system in the rationalization of resource management through proper management of resources and try to use the idle capacity and determine the costs of the services provided by Services Business Firms accurately and providing useful information to help in the process control, as well as provide information to assist in decision-making and thus achieve a competitive advantage for Services Business Firms.

The above-mentioned study aimed to demonstrate the possibility of Resource Consumption accounting approach as one of the alternatives to develop cost systems, while this study examined the effect of the resource consumption accounting and total quality on strategic cost management.

Study of Mokhtar, Abdel Aziz (2013)¹:

The main objective of this research is to use the resource consumption accounting in the development of cost management systems under the modern manufacturing environment. The hypothesis of research was that the application of resource consumption accounting is of great importance in meeting the needs of companies from the appropriate information on how to optimize the use of available resources and employ idle energies, The use of resource consumption accounting will increase the effectiveness of interdependence and integration with cost management systems in optimizing available resources, reducing costs, improving product quality and increasing competitiveness. The researcher relied on inductive and deductive, and reached the following; The application of resource consumption accounting has many advantages in the areas of effective resource planning at the strategic and operational level of the company, there

¹ Mokhtar Abu Sheisha, Abdel Aziz Zidan, an analytical study of resource consumption accounting as an approach to development of cost management systems in modern manufacturing environment, Journal of Financial and Commercial Research, Port Said University, Egypt, vol.14 (2). 2013.

is agreement between the views of the study sample on the contributions and effects of resource consumption accounting in the development of cost management systems in the company under study. The study recommended examining the efficiency and effectiveness of the cost systems applied by the modern manufacturing companies and working on developing them.

The above-mentioned study aimed to use the resource consumption accounting system integrated with the other cost management systems in the modern manufacturing environment, while this study aimed to study the effect of the integration between resource consumption accounting and total quality on strategic cost management.

Study of Randa Mursi 2013¹:

The study examined the relationship between the resource consumption accounting model and development the cost management systems in modern economic environment. The problem of study was in recent decades, advances information technology has brought significant improvement to the collection and communication of cost data in organizations. Unfortunately, traditional volume-based costing models do not make good use of available data. These costing models satisfied financial reporting needs but failed to provide information needed for decision making and control.

Despite its theoretical superiority over traditional volume-based costing models, the activity based costing model has failed to replace traditional volume-based costing models in most organizations. In response to the problems of the model, resource consumption accounting model have been developed as a costing model for next generation of cost management systems. A key feature that distinguishes RCA model from traditional volume-based costing models and the ABC model is the recognition of idle resources in resource pools. Recognition of idle resource in RCA model simplifies the development and maintenance of cost management systems, and enables cost management systems to provide more relevant and reliable cost information for decision making.

The above-mentioned study examined the relationship between the resource consumption accounting model and development the cost management systems, while this study examined the effect of the resource consumption accounting and total quality on strategic cost management.

¹ Randa Mursi Kiwan, Usage of the accounting model for resource consumption in the development of cost management systems in contemporary economic conditions, The scientific journal of economy and trade, 2013.

Study of Walid Ahamed 2013¹:

The main objective of the research is to identify the impact of the integration of the resource consumption accounting system with the ERP system on cost management. The increasing challenges faced by business organizations in modern industrial environment at present as a result of strong competition pressure and handle multiple clients' needs and decision makers at all levels of management as well as the need for appropriate and accurate information and timely criticism of cost management portal leading to the resource consumption accounting approach early this century that combines cost assumptions approach on the activity basis cost and the German approach which avoid the most cost mistakes the former cost approaches. The research has concluded that the RCA system focuses on theoretical energy that classified into three types; production energy, non-productive energy, and idle energy. The enterprise resource planning system is a critical in the successful application of resource consumption accounting system due to its position of prominence and influence which helps in solving the complex problems, and enterprise resource planning system helps applied enterprises for re-engineering activities, processes and the development of management accounting practices.

The above-mentioned study identified the impact of the integration of the resource consumption accounting system with the enterprise resource planning system on cost management, whilst this study presented the effect of the integration between resource consumption accounting and total quality on strategic cost management.

Study of Younes, Heba (2013)²:

The problem of research was the lack of traditional cost accounting and ABC system in achieving effective cost management under contemporary environment variables, It aims to evaluate the use of the resource consumption accounting approach in cost management in industrial companies, using inductive approach, the study concluded that; ABC system is not fully efficient in obtaining a more accurate cost in all cases, the resource consumption accounting provides effective cost control

¹ Walid Ahmed Mohammed, The Impact of Integration between the Resource Consumption Accounting and Enterprise Resource Planning System In Support of the cost Management, International Journal of Accounting and Auditing, 2013.

² Younes Hassan, Heba Shaker, The use of the entrance of resource consumption accounting in cost management, Scientific Journal of Research and Commercial Studies, Egypt, VOL. 27 (3), 2013.

mechanisms, Resource consumption accounting recognition of the idle capacity is the most important characteristic of this approach.

The above-mentioned study examined the usage of the accounting model for resource consumption in the development of cost management systems, while this study examined the effect of the resource consumption accounting and total quality on strategic cost management.

Study of Mahmoud Rahimi et al. 2014¹:

This study introduces resource consumption accounting as an innovative approach to management accounting which focuses on managers as the primary users of the information and provides the best knowledge of traditional management accounting. This method emphasizes that organization's resource causes costs, therefore in costing systems the focus should be on resources and consumption of them. The study presented introduction of resource consumption accounting and some details on the philosophy of this costing technique, and how this method combines features of both ABC model and German costing accounting known as GPK, and takes the advantages of these two models.

The purpose of this study is to explain the concept of resource consumption accounting, its components and features and application of this method in organizations. The study concluded that features of this method were compared to other techniques and its advantages over other methods were considered. And the researcher hopes that with more attention to the new techniques in management accounting, calculation community enters a new stage of growth.

The above-mentioned study presented resource consumption accounting as a new approach to management accounting, while this study examined the effect of the resource consumption accounting and total quality on strategic cost management.

Study of ORHAN ELMACI 2014²:

The present study intended to investigate the “Balance Scorecard (BSC) model integrated with Resource Consumption Accounting (RCA)” which

¹ Mahmoud Rahimi et al., Resource Consumption Accounting: A New Approach to Management Accounting, Shahrood University of Technology, IRAN, Academy of Business & Scientific Research, Volume: 3, Issue: 4, (June 2014).

² Orhan Elmaci, A model proposal concerning balance scorecard application integrated with resource consumption accounting in enterprise performance management, International Journal of Organizational Leadership, 2014.

helps to evaluate the enterprise as matrix structure in its all parts. It aims to measure how much tangible and intangible values (assets) of enterprises contribute to the enterprises. In other words, it measures how effectively, actively, and efficiently these values (assets) are used. In short, it aims to measure sustainable competency of enterprises. As expressing the effect of tangible and intangible values (assets) of the enterprise on the performance in mathematical and statistical methods is insufficient, it is targeted that RCA Method integrated with BSC model is based on matrix structure and control models. The effects of all complex factors in the enterprise on the performance (productivity and efficiency) estimated algorithmically with cause and effect diagram. The contributions of matrix structures for reaching the management functional targets of the enterprises that operate in market competitive environment increasing day to day are discussed. So in the context of modern management theories, as a contribution to BSC approach which is in the foreground in today's administrative science of enterprises in matrix organizational structures, multidimensional performance evaluation model -RCA integrated with BSC Model proposal- is presented as strategic planning and strategic evaluation instrument.

The above-mentioned study investigated a model proposal concerning the Balance Scorecard (BSC) integrated with Resource Consumption Accounting (RCA) in enterprise performance management, whilst this study investigated the effect of the integration between resource consumption accounting and total quality on strategic cost management.

Study of Sideg Adam 2014¹:

This study investigates in lack of traditional cost methods used in the sector of sugar industry in the Sudan to produce cost information useful for the management to perform control functions and reduce the cost in light of severe competition in the world of today has encountered between business enterprise, whether local or international. The research aimed to determine the extent to which modern cost accounting methods affect control and reduce the cost in the sector of sugar industry in the Sudan, the research also aimed to study the extent of the possibility of applying the accounting for resource consumption in the sector of sugar industry in Sudan and the effect on cost reduction. The findings of this study were as follow: a-Identifying activities contributing to form the product in a detailed manner, increases the efficiency of the activity performance which in turn may contribute to

¹ Sadiq Adam Mohammed, Modern Methods of Cost Accounting and its Role in the Control and Cost Reduction in Industrial Firms, PhD, Dissertation in cost & management accounting, SUST, 2014.

reduce the product cost. b. Application of the method of accounting for resource consumption helps identify the actually required resources to be used for the future, which may lead to reduce the percentage of the lost resource. C. Putting forward a future outlook to know how to employ the optimal utilization of the resources activities, will increase the performance efficiency of the activities, which in turn may lead to reduce the cost.

The above-mentioned study investigated in which modern cost accounting methods affect control and reduce the cost, whilst this study investigated the effect of the integration between resource consumption accounting and total quality on strategic cost management.

Study of Yara Saad (2014)¹:

This research tried to strengthen the competitiveness of businesses by using an entrance of resource consumption accounting - the next generation of cost management systems. The research problem was represented in the following question: The possibility of improving the quality of the outputs of an accounting system for the cost through the entrance of RCA- the next generation of cost management systems?

The hypotheses were as follows:

- There is no significant impact of the entrance of RCA at improving the cost accounting system outputs.
- There is no significant impact of the entrance of RCA at improve the value of the enterprise.

The researcher used the inductive approach and found the following results; the cost determined by the entrance of RCA is valid for different concepts of control, the entrance of RCA is concerned with measuring the efficiency of the objectives of reducing the cost of resources whether used or not, there is a significant impact of the entrance of RCA in improving the cost accounting system outputs, and improving the value of the enterprise.

The above study aimed to improve the quality of the cost accounting system outputs through the resource consumption accounting system as an entrance to cost management in one of the government units, while the aim of this study was to identify the impact of the integration of resource consumption accounting and total quality on strategic cost management In Sudanese industrial companies.

Stud of Ercument OKUTMUS 2015¹:

¹ Yara Saad Ali, Resource Consumption Accounting: next-generation of cost management systems, Journal of Accounting Thought, Ain Shams University, Faculty of Commerce, Cairo, Special Issue, 2014.

In this study the problem was depict globalization and high competition have resulted in the quick change in the expectations of the customers and organizations of the firms, production processes and types. Especially changes in the technology and high competition have compelled the accounting data system to change, and the traditional methods have been insufficient against this change. These developments have enabled the firms to develop new methods in order to calculate the costs correctly and make decisions by taking into consideration of the cost and management accounting methods. Direct labor expenses are decreased because of the technological developments in the accounting and cost management, therefore as a result of the increase of the automation systems in the production overhead manufacturing expenses increase, and transition to the new methods which can provide more correct cost data is required. One of these methods is RCA which combines German cost accounting and ABC methods. In a RCA study which is applied in a glass production management founded in Antalya region.

According to the findings obtained from the study, the products do not get any share from the resources that they do not consume, and real cost data associated with the production costs is provided. The calculation of the idle capacity and its loading on the responsible unit or person, increase the effectiveness and productiveness of the firm by providing real cost data.

The above study aimed to study and define resource consumption accounting with cost dimension, while the aim of this study was to identify the impact of the integration of resource consumption accounting and total quality on strategic cost management.

Stud of Lesi Hertati 2015²:

This study aims to determine the Total Quality Management (TQM) as a technique in management accounting strategies. Total Quality Management (TQM) is strategic for customer satisfaction in the long term that is obtained from the information. Quality information is the way to continuous improvement in order to increase the company's financial performance in the long term to increase competitive advantage. Strategic Management Accounting process, gather competitor information, explore opportunities to

¹ Erçument OKUTMUS, Resource Consumption Accounting with Cost Dimension and an Application in a Glass Factory, Akdeniz University, Turkey, International Journal of Academic Research in Accounting, Finance and Management Sciences, Vol. 5, No.1, January 2015.

² Lesi Hertati, TOTAL QUALITY MANAGEMENT AS TECHNICS ON STRATEGIC MANAGEMENT ACCOUNTING, International Journal of Recent Advances in Multidisciplinary Research, Vol. 02, Issue 11, 2015.

reduce costs, integrate accounting with emphasis on the strategic position is a great plan of the competition. TQM is an overall strategic plan, interrelated and serve as a basis for achieving the target or goal that is superior.

The above-mentioned study aimed to determine the Total Quality Management (TQM) as a technique in management accounting strategies, whilst this study aimed to determine the Total Quality Management as a technique in Strategic Cost Management.

Study of Mahmoud Abd Allah 2015¹:

This study tests the effect of implementation of methods of strategic analysis in Sudanese companies in reducing cost. Been in the importance of scientific research, there is a severe shortage that is almost non-existent writings taught directly strategic analysis methods and their role in reducing costs in the Sudan for this, the scientific importance of this research stems from the coverage of the most important shortcomings and weaknesses in the previous few research. As for the importance of the process of this research in that it deals with one of the important problems facing the economic establishments of our times is how to reduce costs while retaining a distinct level of quality, as well as comes its importance in that it works to the attention of the Sudanese industry to the need to take advantage of strategic analysis methods for the purpose of reducing costs, in order to support competitive advantage in contributing to the continuity and consolidation and strengthening of the competitive position of the industry in Sudan. The most important findings were: a-working mode of continuous improvement to reduce costs for industrial companies and the Sudanese through the identification and measurement of the cost of products in minutes. B- The application of the manner of the targeted cost leads to lower cost for industrial companies and the Sudanese through the reduction of product lifecycle cost. C. Working model of the value chain to reduce costs by addressing the traditional ways to reduce industrial costs of industrial companies Sudanese defects analysis.

The above-mentioned study tested the effect of implementation of methods of strategic analysis in Sudanese companies in reducing cost, while this study investigated the effect of the integration between resource consumption accounting and total quality on strategic cost management.

¹ Mahmoud Abd Allah, Methods of Strategic Analysis AND their Role in Reducing Costs in Industrial Companies, PhD, Dissertation in cost & management accounting, SUST, 2015.

Stud of Elizabeta, Elenior, Biljana 2016¹:

The subject of this paper is the design and implementation of the philosophy of total quality management (TQM) in some segments of Macedonian Railways Transport, which produce services of public interest in the Republic of Macedonia, by analyzing the company's business processes and optimizing them to achieve consistently exceeding the growing expectations of service users. Special activities are analyzed in control department of revenue or in business process of data input from the tickets where mistakes are detected on a monthly basis. To this aim, is used the TQM methodology which is based on exploiting the knowledge of all employees and operating teams in the continuous improvement of business processes, including the methods and techniques for faultless operation. The results of this study showed that the application of total quality management in Macedonian Railways Transport not only lead to improvement of service quality, but also increased productivity and cost optimization of quality. Also the application of statistical methods and techniques shrink defects in operation and is a significant benefit, especially when looking for quality at the lowest fixed costs of operations; and by analyzing the cost of quality can be controlled losses and to reduce them to the minimum in terms of consumption of materials and energy. In the future, the implementation of this methodology in the company will not only enable satisfaction of service users, but also satisfaction to suppliers, employees and the community.

The above-mentioned study subject was the design and implementation of the philosophy of total quality management (TQM) in some segments of Macedonian Railways Transport, while the subject of this study was the effect of total quality on strategic cost management in food industrial companies.

Study of Faiza ALghabban 2016²:

This study aimed to identifying the impact of integration between enterprise resources planning system and the resource consumption accounting, and its reflections on the cost management. This study also aimed to demonstrate the possibility of resource consumption accounting approach as one of the

¹ Elizabeta MITREVA, Elenior NIKOLOV, Biljana NIKOLOVA, Application of Total Quality Management (TQM) in the Macedonian Railways Transport in the Republic of Macedonia, Quality Access to Success, Vol. 17, No. 151, 2016.

² Faiza ALghabban, Improving the efficiency and effectiveness of the cost systems of the Iraqi economic units applied to the unified accounting system according to the framework of cost measurement to rationalize the resources under the variables of the contemporary business, Journal of Accountant, 2016.

alternatives to develop cost systems and in response to changes in modern environment for helping in rationalize and manage resources for firms, where it has been proposed a framework for resource consumption accounting approach can be applicable in firms. This study results were as follow: A- the cost accounting systems is one of the main pillars to insuring the stability of the financial system because of its role to provide decision-makers with financial non-financial information to enable them to make strategic decision. B- the resource consumption accounting approach contributes in the solving of the problems facing both the traditional cost accounting system and activity based costing system in the rationalization of resource management through proper management of resources and try to use the idle capacity and determine the costs of the product provided by product business firms accurately and providing useful information to help in the process control, as well as provide information to assist in decision-making and thus achieve a competitive advantage for product business.

The above-mentioned study aimed to identifying the impact of integration between enterprise resources planning system and the resource consumption accounting, and its reflections on the cost management, whilst this study aimed to study the integration between resource consumption accounting and total quality and the effect on strategic cost management.

Study of Fares EL Tayeb 2016¹:

These study examined the role of strategic cost analysis in reducing activities cost for supporting the competitive advantage of industrial firms in modern business environment, the problem was to measure and test the contingent effect of strategic cost analysis on activities cost and how to integrate the strategic cost analysis and strategic position analysis for supporting competitive advantage in industrial firms. The main hypotheses indicated that there is a relationship strategic cost analysis and reducing activities cost and the strategic cost analysis affects supporting the competitive advantage. There is also a relationship between reducing activities cost and supporting the competitive advantage. The declining of activities cost would have effect on the relationship between strategic analysis cost and supporting the competitive advantage in industrial firms. The most important findings were: the application of strategic cost analysis leads to support the competitive advantage in industrial firms as well as the

¹ Fares EL Tayeb, The Role of Strategic cost of Activities for supporting Competitive advantage in manufacturing firms, PhD, Dissertation in accounting, AL Nelain University, 2016.

value chain analysis leads to reduce the activities cost. The cost drivers analysis wouldn't reduce the activities cost. However the strategic position analysis for firms wouldn't also reduce activities cost but reducing activities cost leads to support the competitive advantage for industrial firms.

The above-mentioned study examined the role of strategic cost analysis in reducing activities cost for supporting the competitive advantage, while this study investigated the effect of the integration between resource consumption accounting and total quality on strategic cost management.

Stud of Mohamed Fathy (2016)¹:

The fundamental purpose of this research paper is to point out the possibility of adopting and applying RCA, explain its concepts, distinguishing features, identify the challenges and application troubles of this approach in the Egyptian business environment. Consequently, the research approach is a combination between deductive and inductive approaches; (1) the research is attempting to scrutinize the extent of understanding the RCA principles through conducting a survey as a research strategy in the automotive industry in Egypt (Deductive Perspective). Alternatively, (2) the study is seeking to determine the pivotal influence of adopting and applying RCA on the cost accounting system (Inductive Perspective). The study tested the following hypotheses; H1: Firms that adopt a comprehensive view of resources are more likely to operate and fulfill RCA. H2: Firms that apply the causality relationship between resource consumption and cost objects based on amounts are more likely to develop and apply RCA. H3: Firms that recognize unused resources and determine the idle capacity are more likely to accomplish the philosophy of RCA. H4: Firms that have a management support to the contemporary management accounting techniques are more likely to develop and achieve the objectives of RCA. The main findings of this study are: RCA – to a large extent - is a new technique in the Egyptian business environment and it needs an accurate database to identify the various resources of the company and emphasis on causal relationships between the company's resources and outputs, (2) RCA requires support from top management because any new concept cannot be adopted or applied without top management support physically and financially.

¹ Mohamed Fathy Elshahat, RESOURCE CONSUMPTION ACCOUNTING (RCA): THE CHALLENGES AND APPLICATION OBSTACLES, The International Academy of Business and Public Administration Disciplines, Summer Conference in Istanbul, Turkey, 2016.

The above-mentioned study tried to explain and study the possibility of adopting and applying resource consumption accounting in the automotive industry, while this study examined the effect of the resource consumption accounting and total quality on strategic cost management in food industry.

Study of Sana Hamzat 2016¹:

In light of the inability of the traditional cost systems to provide the necessary information to make decisions with the accuracy and appropriate timing, the enterprises saw the need to switch to modern entrances to take benefit of the advantages they have in order to be able to stay in the global market by focusing on both quality and cost. The aim of this study is to identify the impact of TQM implementation within the industrial establishments used for the target cost input and to indicate the expected positive effects of helping to manage costs better, which enables these establishments to withstand the competition market. This study results were as follow; TQM seeks to improve product quality and reduce total cost, the implementation of the Total Quality Management System (TQMS) helps to manage costs in the facilities used for the target cost input. The study recommended the need to raise awareness of the TQM system and to disseminate it more widely by subjecting the employees in the establishment to training courses on the basis that this system is one of the pillars of success in the competitive environment as it focuses on the quality of the product and the establishment as a whole.

The above-mentioned study aimed to identify the impact of TQM implementation within the industrial establishments used the target cost input to manage costs better, whilst this study investigated the effect of the integration between resource consumption accounting and total quality to achieve strategic cost management.

Study of WAY Yusoff, et al. 2016²:

The objectives of this study are carried out to investigate the level of TQM implementation and to pinpoint areas lacking in implementation among a various type of industries in north region province, Kingdom of Saudi

¹ Sana Musleh Hamzat, The Effect of Implementation Total Quality Management in Cost Management in The Firms Used For The Target Costing Approach Empirical Study in a Medical Manufacturing Firm, Unpublished Master Thesis, Damascus University, Faculty of Economics, 2016.

² WAY Yusoff, et al., A survey on the implementation of Total Quality Management (TQM) at manufacturing industries in north region, Kingdom of Saudi Arabia, 2nd International Conference on Information Management (ICIM), London, UK, 2016.

Arabia (KSA). In this research, a survey was carried out on manufacturing industries in North region of KSA to understand their quality management status. The study concludes that the applications of TQM have been widely discussed, but the challenges of implementation have received little attention. A quality philosophy is required for the successful implementation of a quality project. This philosophy must facilitate a long-term lifestyle change for manufacturing industries. Commitment of top management is essential. Substantial inflow of resources, adequate training, workforce participation and effective measurement techniques are some of the key success factors. A successful TQM program is unique, and it should motivate middle management to focus on long-term strategies rather than short-term goals.

The above-mentioned study investigated the level of TQM implementation and to pinpoint areas lacking in implementation among a various type of industries, whilst this study examined the effect of the integration of total quality and resource consumption accounting on strategic cost management.

Study of Gezahegn, Daniel (2017)¹:

This study reviews the existing practices of TQM and JIT programs, explores their relationships, and provides modifications to the integrated TQM and JIT framework by developing an improved integrated TQM and JIT approach that can enhance the continuous improvement efforts and global successes of companies. The study also provides a case application for Ethiopian leather and leather manufacturing companies to practically apply the model proposed in this research and to solve the related problems of the companies. The study concludes that the effectiveness of the two programs to link the core company to its various stakeholders (other than suppliers and customers) is limited. Furthermore, if the TQM and JIT principles have to help mainly the firms in developing countries towards fulfilling the needs of their technological and knowledge requirements from different sources (and hence, technology transfer and its accumulation), additional TQM and JIT practice, which is concerned with technological capability accumulation process, must be added to the existing ones. The case study used in this research proves the significance of the new model proposed in this research. According to the case study, the Ethiopian leather and leather manufacturing companies have low

¹ Gezahegn Tesfayea, Daniel Kitaw, A TQM and JIT Integrated Continuous Improvement Model for Organizational Success: An Innovative Framework, Journal of Optimization in Industrial Engineering, VOL. 22, 2017.

performances in all the areas of TQM and JIT integrated practices. Finally, it can be concluded that the competitiveness and success of manufacturing companies rely on their capability of these practices. Accordingly, companies have to undergo a total revolution in all the dimensions of the integrated TQM and JIT practices proposed in this research in order to improve their global competitiveness.

The above-mentioned study aimed to develop an improved integrated TQM and JIT approach that can improve competitiveness and success of manufacturing companies, whilst this study aimed to study the integration between resource consumption accounting and total quality and their effect on strategic cost management.

Study of Jonny, Kriswanto 2017¹:

This study is aimed to develop a Total Quality Management (TQM) Model for Healthcare Industry. This model suggests that there are at least eight TQM practices that the hospital should pay attention to in order to improve its quality of care. This signifies new principles that hospitals should pay attention to when improving the hospital quality of care. These principles cover top management and commitment (TMC), teamwork and participation (TWP), process management (PM), customer focus and satisfaction (CFS), resource management (RM), organizational behavior and culture (OBC), continuous improvement (CI), training and education (TE) and hospital performances (RES). In which for hospital sector, TMC and TWP may play an important role as catalyst to activate the model so that all component of the model can work effectively to promote the quality of the hospital.

The above-mentioned study aimed to develop a Total Quality Management (TQM) Model for Healthcare Industry, while this study aimed to study the effect of total quality on strategic cost management in food industrial companies.

Study of Rapih Mohamed (2017)²:

This study examines the integration between Total Quality Management (TQM) and BSC four perspectives in Iraqi manufacturing industry. The

¹ Jonny, Kriswanto, Developing a Total Quality Management Model for Healthcare Industry: An Indonesian Hospital Case Study, International Conference on Industrial Engineering and Engineering Management, Singapore, 2017.

² Rapih Mohamed, The Integration between Strategic Cost Management Techniques to Improve the Performance of Iraqi Manufacturing Companies, Asian Journal of Finance & Accounting, Vol. 9 (1), 2017.

problem was performance of manufacturing industry in Iraq has been declining over the last few decades. Worst still, many companies in the manufacturing sector in Iraq are yet to adopt Balanced Scorecard (BSC) to improve their performance despite its potency ensure to achieve competitive advantage and better performance. Data were collected by means of structured questionnaire survey using simple random sampling and a Partial Least Squares (PLS) algorithm and bootstrap techniques were used to test the hypothesis of the paper. The result revealed that TQM had a significant positive effect on BSC through the measurement of customer perspective, financial perspective, innovation and learning perspective, and internal business process perspective. The finding implies that Iraqi manufacturing industries can attain the performance of their companies in the different perspective of BSC by proper implementation of TQM technique.

The above-mentioned study examined the integration between Total Quality Management (TQM) and Balanced Scorecard (BSC) as strategic cost management techniques to improve the performance of manufacturing industry, whilst this study examined the integration between resource consumption accounting and total quality and its effect on strategic cost management.

Study of Salwa Hussein, Abeer Ahmed (2018)¹:

The problem of research is to try to formulate a framework for the development of cost management systems and Constraints and bottlenecks imposed by economic resources, through the integration of the cost of resource consumption and the Constraints approach, which will increase the efficiency and effectiveness of operational science, increase profitability, employ limited and idle resources and remove those constraints and bottlenecks imposed by economic resources. The single application of constraint theory is the failure to measure cost properly. This theory ignores fixed costs and cash as time costs, and focuses on maximizing profit and achievement in the short term only, which may damage the enterprise in the long run by not focusing on the exploitation of unrestricted resources this leads to a lack of attention to the improvement of these resources. The need for another method to supplement the constraints approach can be more

¹ Salwa Hussein Roshdy, Abeer Ahmed Abdel Hafez, The impact of the integration of Resource Access Accounting (RCA) and Constraint Theory (TOC) on resource rationalization, Second International Scientific Conference on Environment, Sustainable Development and Community Service, Al - Azhar University, Egypt, 2018.

accurate in allocating costs, paying attention to idle capacities, managing them and planning resources. The integration of resource consumption accounting and the constraints approach leads to more accurate measurement of costs and optimal utilization of available capacities and management of restricted resources, resulting in increased profitability and competitive support of the enterprise.

The above-mentioned study tried to formulate a framework of the integration of Constraints Theory (TOC) with Resource Consumption Accounting (RCA) on resource rationalization, whilst this study investigated the effect of the integration between resource consumption accounting and total quality on strategic cost management.

Study of Sin Kit, Muhammad, Noormaizatul, 2018¹:

The central problem was hotel industries may face a wide variety of saturated and uncertain TQM practices available for their organization nowadays. As there is a lack of comprehensive knowledge regarding TQM issues in hotel industry, there is an urgent need for a process which will assist hotel industries in Malaysia to evaluate these TQM practices and select the most appropriate one in order to provide the ideal management practices for the entire organization. From a theoretical point of view, this current study contributes in providing further evidence that may contribute to enhancing our understanding and knowledge of the relationship between quality management and competitive advantage. In addition, thus far, limited studies have been conducted using mixed methods to widely explore the quality management phenomenon in Malaysia hotel settings. From a methodological point of view, this study attempts to fill the previous empirical gaps by adopting the mixed method research approach that can elicit clear and well-rounded answers on the degree and extension of quality management practices in Malaysia hotel industry. On the practical level, research in this regard will help hotel managers understand what aspects of TQM are most vital on enhancing competitive advantage, thereby aiding decision making on resource allocation.

The above-mentioned study studied the impact of Total Quality Management (TQM) on Competitive Advantage in The Malaysia Luxury Hotel Industries,

¹ Sin Kit Yeng, Muhammad Shahar Jusoh, Noormaizatul Akmar Ishak, The Impact of Total Quality Management (TQM) on Competitive Advantage: A Conceptual Mixed Method Study in The Malaysia Luxury Hotel Industries, Academy of Strategic Management Journal Volume 17, Issue 2, 2018.

whilst this study studied the effect of total quality on strategic cost management in Sudanese food industrial companies.

Some of the previous studies investigated in the RCA or TQM system to develop cost systems and in response to changes in the modern environment, these studies covered the theoretical framework of RCA and TQM in all its aspects. Accordingly, this study benefited from all these studies, and can be considered as an extension of the studies mentioned above and a new addition to them, by taking resource consumption accounting integrated it with total quality management system. The studies which combined all the methods used to achieve cost management have a weakness point which is the organization cannot apply all these methods in the same time, they should focus on one or two systems to see the impact of it on the organization. The rest of the studies combined two systems to determine the impact on cost management. Some of them integrated the Resource Consumption Accounting system RCA with another system, while the other took the Total Quality Management system TQM with another system, while this study combined the two systems RCA & TQM to determine their effect on strategic cost management, which is applied for none of the previous studies, as far as I know...

Chapter Two

Costing Systems

Over the past decades, changes in the business environment have profoundly affected cost accounting and cost management. In this modern day of severe competition, any business organization has to pay attention to their cost of production, it had become even more crucial to compute cost on a scientific basis and then cost control and cost reduction. Hence it has become essential to study the basic principles and concepts of cost accounting. This chapter discussed costing systems, reviewing some basic terms and concepts of cost and cost systems, this was done through two sections as follows:

Section One: Overview of Costing Systems

Section Two: Resource Consumption Accounting

Section One

Overview of Costing Systems

2.1.0 Introduction

The provision of accurate, correct and appropriate information about the cost is one of the basics of any institution so that it can manage its resources efficiently and plan and solves the problems faced, and the development of its products or services and the development of the institution as a whole. In order to obtain this type of information, the company must rely on appropriate costing systems suitable for development and environmental changes and develop them. This section presents cost systems consisting of traditional system, activity based costing system and German cost system, but before entering into the different cost systems, some basic terms and concepts of cost must be exposed.

2.1.1 Basic Cost Concepts:

- **Cost:** The word 'Cost' is used in a variety of ways. According to Shillinglaw “cost represents the resources that have been or must be sacrificed to attain a particular objective.” The Official Terminology of the Chartered Institute of Management Accountants, London, defines the term cost as “the amount of expenditure (actual or notional) incurred on, or attributable to, a specified thing or activity”¹.

Cost is defined by W.M. Harper in the following words "Cost is the value of economic resources used as a result of producing or doing the thing cost"

Cost is a more general term that refers to a sacrifice of resources and may be either an opportunity cost or an outlay cost².

The definition which is considered comprehensive is the AICPA which defines cost as the amount measured in money or cash expended or other property transferred, capital stock issued, services performed or a liability incurred in considerations of goods or services received or to be received³

- **Costing:** The costing terminology of C.I.M.A., defines costing as the techniques and processes of ascertaining costs. These techniques consist of

¹ S.P. IYENGAR, Cost Accounting principles & practice, SULTAN CHAND & SONS, Ninth edition, Delhi, 2002, p. 6.

² MICHAEL MAHER, Cost Accounting Creating Value for Management, Fifth Edition, The McGraw-Hill Companies, Inc., U.S.A, 1997, p 13.

³ Dr. P. Periasamy, A Textbook of Financial Cost and Management Accounting, Himalaya Publishing House, Mumbai, 2010, p 298.

principles and rules which govern the procedure of ascertaining cost of products or services¹.

After identifying the cost and ascertaining this cost the next step comes is cost accounting.

- **Cost Accounting:** cost accounting is defined by The Official Terminology thus; “the establishment of budgets, standard costs and actual cost of operations, processes, activities or products; and the analysis of variances, profitability or the social use of funds. ²”

- **Cost Accounting System:** A cost system is just one information source for managers in their everyday decision, but the most important one. The essential purpose of any costing system is to provide cost information with the aim to help managers to plan, control, coordinate, direct and make decisions³.

- **Cost unit:** cost unit is defined by The Terminology as a unit of product or service in relation to which costs are ascertained.

To calculate the unit cost, it is necessary to divide the company into small units, which is known as cost centers.

- **Cost Centers:** The Terminology defines a center thus⁴: department, area or function to which costs and/or revenues are charged. Or a production or service location, function, activity or item of equipment for which cost are accumulated.

Costs are categorized into different types, due to the different cost uses, but the most commonly used classification of costs is direct and indirect costs.

- **Direct costs:** a direct cost is a cost that can be traced to a single cost objective.⁵ In return, the costs that cannot be traced to a single cost objective its indirect cost or cannot be linked directly to cost objective. Direct cost can also be classified into; direct material cost, and direct labor cost.

- **Direct material cost:** a direct material is a material which actually enters into and becomes parts of the specified finished product⁶. Materials that do not directly interfere with the composition of the product, for example, the cleaning materials of the factory are not considered direct materials because they do not interfere directly in the composition of the product.

¹ Sri. Vinesh Ottuparammal, Smt. T. Shameera Kunhu. T, Dr. K. Venugopalan, COST ACCOUNTING, Calicut University, India, 2011, p6.

² S.P. IYENGAR, Op. Cit. p6.

³ Livia RAC, dr Györgyi PETKOVICS, Op, Cit.p747.

⁴ Ibid. p7.

⁵ Robert N. Anthony, Glenn A. Welsch, Fundamentals of Management Accounting, D.B. Taraporevala Sons & Co. private Ltd, Bombay, 1981. P72.

⁶ Ibid. p 74.

Also, attention must be paid to materials that are directly involved in the composition of the product, but are not considered as direct substances, because they are small in size or cost, or are considered relatively unimportant this has been explained by Eric; “Sometimes it isn’t worth the effort to trace the costs of relatively insignificant materials to end products. Such minor items would include the solder used to make electrical connections in a Sony TV or the glue used to assemble an Ethan Allen chair. Materials such as solder and glue are called indirect materials and are included as part of manufacturing overhead.¹”

- **Direct labor cost:** direct labor is labor used to convert raw material into the finished product. The direct labor costs of a product are those labor costs which can be specifically traced to or identified with the product or which vary so closely with the number of units produced that a direct relationship can be presumed to be present².

In the same way, labor costs that cannot be directly tracked to the units produced are considered indirect labor costs.

- **Manufacturing overhead cost:** includes all manufacturing costs except direct materials and direct labor³.

This means that it includes the cost of indirect materials, indirect labor and services, and services are all indirect because a particular service cannot be linked to the unit of the product.

Since indirect costs cannot be directly linked to the product unit, they need a way to link that cost to the unit of the product, which is known as overhead allocation.

- **Overhead allocation:** A cost allocation is a process of assigning costs when a direct measure does not exist for the quantity of resources consumed by a particular cost object⁴.

2.1.2 METHODS OF COSTING:

“The term 'methods' and 'systems' are used synonymously to indicate an integrated set of procedures based on a complex concept of ideas, principles and concepts”⁵. The term costing has already been defined as the techniques and processes of ascertaining costs.

¹ Eric W. Noreen, Peter C. Brewer, Ray H. Garrison, Managerial Accounting for Managers, second edition, Mc Graw-Hill Irwin, New York, 2011, p36.

² Robert N. Anthony, Glenn A. Welsch , Op. Cit. p75.

³ Eric W. Noreen, Peter C. Brewer, Ray H. Garrison, Op. Cit. p37.

⁴ Colin Drury, Management and Cost Accounting, sixth edition, Thomson, London, 2004, p58.

⁵ Dr. P. PERIASAMY, Op. Cit. p 305.

To determine the cost of a particular product depends on the nature of that product and the methods used in production. Since there is a difference in methods of production, there is a difference in methods of costing.

Costing methods can be grouped into two broad categories:

(1) Job costing and. (2) Process costing.

(1) Job Costing:

In this system, a cost object is a unit or multiple units of a distinct product or service called a job. Each job generally uses different amounts of resources. The product or service is often a single unit. Job costing is also used to cost multiple identical units of a distinct product. Because the products and services are distinct, job-costing systems accumulate costs separately for each product or service¹.

In job costing, costs are collected and accumulated according to products or work orders. Each job is treated as a project for the purpose of costing. The direct costs are compiled through the respective abstracts and overheads are charged on a predetermined basis to arrive at the total cost. Job costing is used in contracting companies, furniture making, shipbuilding, etc. Job costing is classified into²;

(a) Contract costing. (b) Cost plus contract and (c) Batch costing

(a) Contract Costing: Contract (or terminal) costing, is one form of application of the principles of job order costing. In contract costing each contract is treated as a cost unit and costs are ascertained separately for each contract. It is suitable for business concerned with building or engineering projects or structural or construction contracts. Usually, there is a separate account for each contract. The contract account is debited with all direct and indirect expenditure incurred in relation to the contract. It is credited with the amount of contract price on completion of the contract. The balance represents profit or loss made on the contract and is transferred to the profit and loss account. In case, the contract is not completed at the end of the accounting period, a reasonable amount of profit, out of the total profit made so far on the incomplete contract, may be transferred to profit and loss account³.

¹ Charles T. Horngren, et al., Cost Accounting A Managerial Emphasis, 13th ed., Pearson Prentice Hall, U.S.A, 2009, p 125.

² Dr. P. PERIASAMY, Op. Cit. p 305.

³ The Institute of Cost Accountants of India, Cost and Management Accounting, Repro India Limited, 12th ed., 2012, p 254.

(b) Cost plus Contract: These contracts provide for the payment by the contractor of the actual cost of manufacture plus a stipulated profit; the profit to be added to the cost. It may be a fixed amount or it may be a stipulated percentage of cost. These contracts are generally entered into when at the time of undertaking of a work, it is not possible to estimate its cost with reasonable accuracy due to unstable condition of material, labor etc. or when the work is spread over a long period of time and prices of materials, rates of labor etc. are liable to fluctuate¹.

These types of contracts give protection to the contractor against fluctuations in profits as he is guaranteed about his profit irrespective of the actual costs. However, in order to avoid any dispute in the future, it is always advisable to specify the admissible costs in advance. Similarly, the customer may also reserve the right of demanding 'cost audit' in order to check the reliability of the claim of the contractor regarding the increase in the costs².

(c) Batch Costing: In Batch Costing, a lot of similar units which comprise the batch may be used as a cost unit for an ascertainment of cost. Separate Cost Sheet is maintained for each batch by assigning a batch number. Cost per unit of product is determined by dividing the total cost of a batch by the number of units of the batch³.

Batch costing is used where units of a product are manufactured in batches and used in the assembly of the final product. Thus components of products like television, radio sets, air conditioners and other consumer goods are manufactured in batches to maintain uniformity in all respects. It is not possible here to manufacture as per the requirements of customers and hence rather than manufacturing a single unit, several units of the component are manufactured. For example, rather than manufacturing a single unit, it will be always beneficial to manufacture say, 75, 000 units of the component as it will reduce the cost of production substantially and also bring standardization in the quality and other aspects of the product. The finished units are held in stock and normal inventory control techniques are used for controlling the inventory. The batch number is given to each batch manufactured and accordingly, the cost is worked out⁴.

(2) Process Costing:

In this system, the cost object is masses of identical or similar units of a product or service. In each period, process-costing systems divide the total costs of producing an identical or similar product or service by the total

¹ Dr. P. PERIASAMY, Op. Cit. p 305.

² The Institute of Cost Accountants of India, Op. Cit., p 131.

³ Dr. P. PERIASAMY, Op. Cit. p 305.

⁴ The Institute of Cost Accountants of India, Op. Cit., p 126.

number of units produced to obtain a per-unit cost. This per-unit cost is the average unit cost that applies to each of the identical or similar units produced in that period¹.

This costing method refers to a continuous operation or continuous process costing. Process costing method is applicable where goods or services pass through different processes to be converted into finished goods. Process costing is used in Cement industries, Sugar industries, Textiles, Chemical industries etc.

The following are the important variants of process costing system²:

(a) Operation Costing: It is concerned with the determination of the cost of each operation rather than process. It offers scope for computation of unit operation cost at the end of each operation by dividing the total operation cost by total output of units.

(b) Operating Costing: Operating costing is also termed as service costing. Operating costing is similar to process costing and is used in service industries. This method of costing is suitable for concerns rendering services, for example; Hospitals, Transport, Canteen, Hotels, etc.

(c) Output Costing: Output costing is also called Unit Costing (or) Single Costing. This method of costing is applicable where a concern undertakes mass and continuous production of single unit or two or three types of similar products or different grades of the same products. Under this method cost per unit is measured by dividing the total cost by number of units produced. Output Costing is used in industries like Cement, Cigarettes, Pencils, and Quarries etc.

(d) Multiple Costing: This method of costing means combination of two or more methods of costing like operation costing and output costing. Under this method the cost of different sections of production are combined after finding out the cost of each and every part manufactured. This method of costing is suitable for the industries manufacturing motor cars, engines, aircraft, tractors, etc.

It follows from the foregoing and based on what was stated in the last method mentioned Multiple Costing that, more than one method can be used in one organization for different sections if there is a difference in the way the product is produced or a difference in the nature of activities. The choice of the appropriate method depends on the nature of the service or product and the method of production.

2.1.3 TECHNIQUES OF COSTING

¹ Charles T. Horngren, et al., Op. Cit. p 125.

² Dr. P. PERIASAMY, Op. Cit. p 306.

Costing is the technique and process useful to allocation of expenditure, cost ascertainment and cost control. In order to fulfill the needs of the management it supplies necessary information to the management. The following are the various techniques of costing¹:

- (1) Uniform Costing
- (2) Marginal Costing
- (3) Standard Costing
- (4) Historical Costing
- (5) Absorption Costing

(1) **Uniform Costing:** ICMA London defines Uniform Costing as, “the use by several undertakings of the same costing systems, i.e. the same basic costing methods and superimposed principles and techniques.” Another definition by Prof. Glover “A system of uniform application of the principles of a costing method agreed upon and adopted by the whole or majority of the manufacturer or executives, in any specific industry”².

Based on this way standardization of methods of cost accounting or the development of uniform principles of cost estimation shall be agreed between the manufacturers, that may help in the possibility of comparison between companies, but the nature of the companies may vary in many internal and external factors and may be a reason for the difficulty of applying this concept.

(2) **Marginal Costing:** The C. I. M. A. London defines Marginal costing as "a technique of costing which aims at ascertaining marginal costs, determining the effects of changes in costs, volume, price etc. on the Company's profitability, stability etc. and furnishing the relevant data to the management for enabling it to take various management decisions by segregating total costs into variable and fixed costs"³.

Some believe that marginal cost and variable cost are two terms of one concept, their concept is to introduce variable costs separately from fixed costs so as to help in decision making. It is a principal costing technique used in decision-making which allows management to be focused on the changes which result from the decision under consideration. It is a useful technique for short-term decisions such as Make or Buy, Accepting or Rejecting a Special Order, Deleting a line of business or segment and outsourcing among others⁴.

¹ Ibid., p 306.

² The Institute of Cost Accountants of India, Op. Cit. p 398.

³ Dr. P. PERIASAMY, Op. Cit. p 306.

⁴ Nasieku Tabitha & Oluyinka Isaiah Ogungbade, Cost Accounting Techniques Adopted by Manufacturing and Service Industry within the Last Decade, International Journal of Advances in Management and Economics, 2016, Vol.5(1), p 51.

(3) **Standard Costing:** According to CIMA terminology, standard costing is a control technique that reports variances by comparing actual costs to pre-set standards so facilitating action through management by exception. It refers to the technique which uses standards for costs and revenues for the purpose of control through variance analysis. Standards are established for each cost element on a scientific basis for an immediate future period, and actual are compared against the standard. Variances from standards are analyzed, reasons established and corrective action taken to stop recurrence of inefficient operation. However, this technique has been heavily criticized of loss for relevance by academic scholars. For instance, Johnson and Kaplan posit that standard costing should be abandoned because of its unsuitability for today's highly global and competitive world. As observed by Drury, the usefulness of standard costing is questionable in the modern business that we have in this 21st century because of its changing cost structure, inconsistency with modern management approaches, over-emphasizing the importance of direct labor, and delay in feedback reporting¹.

(4) **Historical Costing:** In this system, costs are ascertained only after they are incurred and that is why it is called as historical costing system. For example, costs incurred in the month of April 2007 may be ascertained and collected in the month of May. Such type of costing system is extremely useful for conducting a post-mortem examination of costs, i.e. analysis of the costs incurred in the past. Historical costing system may not be useful from cost control point of view but it certainly indicates a trend in the behavior of costs and is useful for estimation of costs in future².

(5) **Absorption Costing:** Absorption costing also known as the full costing method is a costing system which treats all costs of production as a product cost regardless of whether they are variable or fixed costs. Absorption costing principles must be used when preparing financial statements for the external purpose. Absorption costing is suitable for determining the price of the product as it ensures that all costs are covered, it shows correct profit calculation, conforms with matching and accrual concepts of accounting, and hence, recognized for the purpose of preparing external reports and for stock valuation. However, traditional absorption costing is probably of limited value in a manufacturing environment where production process are

¹ Ibid., pp. 50-51.

² The Institute of Cost Accountants of India, Op. Cit. p 6.

highly automated, and production overhead costs is a much more significant element of cost than direct labor¹.

There is also another technique of costing like;

Normal costing is a costing system that (1) traces direct costs to a cost object by using the actual direct-cost rates times the actual quantities of the direct-cost inputs and (2) allocates indirect costs based on the budgeted indirect-cost rates times the actual quantities of the cost-allocation bases².

Actual Costing: Both actual costing and normal costing trace direct costs to jobs in the same way because source documents identify the actual quantities and actual rates of direct materials and direct manufacturing labor for a job as the work is being done. The only difference between costing a job with normal costing and actual costing is that normal costing uses budgeted indirect-cost rates, whereas actual costing uses actual indirect-cost rates calculated annually at the end of the year³.

2.1.4 COST ACCOUNTING STANDARDS

Although internal accounting reports need not comply with GAAP, three bodies (Institute of Management Accountants, Society of Management Accountants of Canada, and Cost Accounting Standards Board) issue cost accounting guidelines or standards. The Institute of Management Accountants (IMA) is a voluntary membership organization of accountants, finance specialists, academics, and others. The IMA issues directives on the practice of management and cost accounting called Statements on Management Accounting (SMAs). SMAs are not legally binding, but their rigorous developmental and exposure process helps ensure their wide support. The Society of Management Accountants of Canada (CMA-Canada), which is similar to the IMA, issues Management Accounting Guidelines (MAGs). Like SMAs, MAGs are not mandatory for organizational accounting but suggest high-quality accounting practices. The Cost Accounting Standards Board (CASB) is part of the U.S. Office of Federal Procurement Policy. The CASB's purpose is to issue cost accounting standards for defense contractors and federal agencies to help ensure uniformity and consistency in government contracting. Compliance

¹ Nasieku Tabitha & Oluyinka Isaiah Ogungbade, Op. Cit., p 50.

² Charles T. Horngren, Srikant M. Datar, Madhav V. Rajan, Cost Accounting A Managerial Emphasis, Fifteenth Edition, Pearson Education, Inc., U.S.A., 2015, p 112.

³ Ibid. p 118.

with CASB standards is required for companies bidding on or pricing cost-related contracts of the federal government¹.

Since financial accounting is provided by the institution to external entities, it needs higher standards and oversight bodies so that the information published will not be manipulated. While management accounting and cost accounting are internal needs, therefore, there is no manipulation on it and do not need to be observed. But it needs to be constantly developed as a result of developments in production, economy and technology.

2.1.5 Historical Evolution of Management Accounting

The period when management accounting originated, and the reason for the development thereof, appears to be contentious issues. Some view the requirement for information to optimize economic resources during the Industrial Revolution in the United Kingdom as the beginnings of management accounting. Others such as Chandler (1977) as well as Johnson and Kaplan (1987) suggest that the creation of large corporations that internalized transactions, which were previously priced by the market, were the reason for its development. They are of the opinion that this occurred shortly after the coming of the railways and the telegraph in the United States of America².

A third view does not link the origin of management accounting to any specific time period but sees it as a means for capital to exploit society and to justify and mystify the existence of structural inequality in society. A fourth school of thought is that management accounting only originated when it was used for purposes of cost control and more specifically when accounting information was used to exert human accountability. Armstrong views the development as a result of efforts by the profession to develop their knowledge and techniques into systems of managerial control, in order to achieve managerial ascendancy³.

A fifth view divided management accounting to a specific time period, the details are as follows:

- Management Accounting Techniques Before the 1950s: The (International Federation of Accountants) describes management accounting before 1950 as a technical activity required for the pursuit of organizational objectives. It

¹ Don R. Hansen, CORNERSTONES OF COST MANAGEMENT, 2ed, International Edition, Cengage Learning, 2012, p 7.

² M. Shotter, The origin and development of management accounting, Meditari Accountancy Research, Vol. 7, 1999, P 215.

³ Ibid., pp. 215-216.

was predominantly oriented towards the determination of product cost. Production technology was comparatively simple, with products going through a series of dissimilar processes. Labor and material costs were simply identifiable and the manufacturing processes were mainly governed by the alacrity of manual operations. Therefore, direct labor provided a natural basis for assigning overheads to individual products. The spotlight on product costs was supplemented by budgets and the financial control of production processes¹.

- Management Accounting Techniques from 1950 to 1979s: The focus of management accounting shifted to the provision of information for planning and control purposes in the 1950s and 1960s. In this phase, management accounting is seen by (International Federation of Accountants, 1998) as a management activity, but in a staff role. It involved staff (management) support to line management through the use of such technologies as decision analysis and responsibility accounting. Rather than strategic and environmental considerations, management controls were oriented towards manufacturing and internal administration².

- Management Accounting Techniques from 1980 to 1989s: The increased global competition in the early 1980s and the world recession in the 1970s following the oil price shock threatened the Western established markets. Increased competition was accompanied and underpinned by rapid technological development which influenced many aspects of the industrial sector. For example, the use of robotics and computer-controlled processes improved quality and reduced costs in many cases. In addition, developments in computers, especially the emergence of personal computers, obviously changed the nature, and amount of data which could be accessed by managers. Hence, the design, maintenance and interpretation of information systems became of considerable importance in effective management. The challenge of meeting global competition was met by introducing new management and production techniques, and at the same time controlling costs, often through the reduction of waste in resources used in business processes³.

- Management Accounting Techniques from the 1990s: In the 1990s, the worldwide industry continued to face considerable uncertainty and

¹ Shah Kamal, Historical Evolution of Management Accounting, The Cost and Management Journal, VOL.43 NO.4, 2015, p 14.

² Ibid., p15.

³ Ibid., p15.

unprecedented advances in manufacturing and information processing technologies. For example, the expansion of the worldwide web and allied technologies led to the appearance of Ecommerce that further increased and emphasized the challenge of global competition. The focus of management accountants shifted to the generation or creation of value through the effective use of resources. This was to be achieved through the use of technologies which checkup the drivers of customer value, shareholder value, and organizational innovation¹.

The researcher supports the fifth point of view, which linked the development of management accounting for specific periods of time. It is clear that the development of management accounting is related to the development of industry and technological progress because as technology advances new interests and needs arise, which forces management accounting to develop to provide these needs.

The characteristics of management accounting practices in four stages of evolution are shown in Table below.

Table (2,1,1): Characteristics of Management Accounting Practices in Four Stages of Evolution

	Stage 1: Cost Determination and Financial Control	Stage 2: Provision of Information for Management Planning & Control	Stage 3: Reduction of Waste in Business Resources	Stage 4: Creation of Value Through Effective Resources Use
Representative period	Prior to 1950	1950 - 1964	1965 - 1984	1985 to date
Where positioned in organization	Similar to company secretarial	A 'staff' management activity	Management accounting an integral part of management 'owned' by all managers as the distinction between 'staff' and 'line' management becomes blurred.	
Role	A necessary technical activity in 'running' an organization	Providing info to support 'line' management's operations	Managing resources (including information) to 'directly' enhance profits	Directly enhance outputs and add value through the strategy of 'leveraging' resources

¹ Ibid., p16.

			by bearing down on inputs	(especially information)
Main Focus	Cost determination & controlling expenditure	Information for management planning, control and decision making. Including basic model building	Reduction of waste/loss in business resources through process analysis and cost management technologies.	Creation of value through Using resources effectively to drive customer value, shareholder value, and innovation

Shah Kamal, Historical Evolution of Management Accounting, The Cost and Management Journal, VOL.43 NO.4, 2015, p 19.

Numerous cost and managerial accounting systems have been developed since the 1990s as a consequence of the deficiency of the conventional accounting systems in order to adapt with a number of ongoing production developments such as technological improvements, cost structure changes, and the emergence of lean thoughts. Likewise, several studies have pointed out that up to 80% of firms continue to use conventional production costs approaches, in spite of that several cost and management accountants in these firms articulate discontent with relying on the consequences of their managerial and cost accounting systems¹.

Before studying modern developments and systems in management accounting, it is necessary first to be exposed to the traditional cost systems and to know their shortcomings and the problems that led to the appearance of modern systems.

Here is a brief summary of the traditional costing system;

2.1.6 Traditional Costing System

In this system, the costs of direct material and direct payment are directly allocated to the production. Productive and non-productive overheads have also been considered as direct cost and allocated to production by using the pre-assigned overhead rate. In traditional costing system, based on the volume of cost price, each product consists of the sum of the costs of direct material, direct labor, and the allocated construction overhead².

¹ Mohamed Fathy Elshahat, Op. Cit., p207.

² Fatemeh Kowsari, Changing in Costing Models from Traditional to Performance Focused Activity Based Costing, M.A Student in Industrial Management of Fars Research Science Branch, Islamic Azad University, Shiraz, Iran, 2013, p 2498.

To calculate the overhead rate, the sum of the budgeted construction overhead is divided by the sum of the direct labor hours or any other basis such as machine labor hours. The basic difficulty of this system is that it doesn't give exact information about the cost price of products and services to decision makers and even by giving wrong information it causes managers to make mistakes in their decisions and this system cannot be used as a reference for managerial decisions. Also, in this system the costs of overhead between productions are common. Therefore, some of the products, according to their production cost, have a greater share in allocating the overhead. In the whole, irrelevant costs of the product unit and the variety of products are two important factors which have not been considered in traditional costing system. This costing system is focused more on production cost whereas for marketing and sale costs and other costs no shares are allocated to production. Traditional systems consider the obtained advantages of changing the processes and improving the methods as saving money in the labor force. Therefore, they do not show the improvement of functions in operational processes. Using a common basis and unit for allocating costs such as direct labor hours of human force is considered as another shortcoming of this type of cost. Because by developing the technology, the rate of human force engaging in labor process has decreased to a great extent¹.

During the late 1980s, criticisms of current management accounting practices were widely publicized in the professional and academic accounting literature. In 1987 Johnson and Kaplan's book titled *Relevance Lost: The Rise and Fall of Management Accounting*, was published. An enormous amount of publicity was generated from this book as a result of the authors' claims that firms were still using management accounting practices that had been developed over 30 years ago and that were no longer relevant in today's competitive and manufacturing environment. Opinions seem to differ as to whether or not significant changes in management accounting are necessary, but many commentators have stated that management accounting is in a crisis and that fundamental changes in practice are required².

On the whole, the most important reasons for the shortcoming of the traditional system are as follows³:

¹ Ibid., p 2498.

² Colin Drury, *Management and Cost Accounting*, International Thomson Business Press, 4th ed., UK, 1996, p834.

³ Fatemeh Kowsari, Op. Cit. p 2499.

1- The lack of ability in presenting information about cost price especially in organizations which give various services to their customers. Since the traditional system does not consider the special features of each service in distributing the costs, the allocated costs and the costs price will be considered wrong.

2- The lack of separating different cost domains – In the traditional system, they use common cost centers to gather cost payments and overheads. This problem causes the allocation of unreal costs to the given services.

3- Using common basis and unit for allocating costs – These systems usually used a division basis to allocate different costs. One of these bases is direct human force labor hours. To consider the fact with the complexity and quick technology changes, the engaging rate of human force in labor force has decreased a lot, therefore, by using this basis, the division of cost is not really done.

4- The lack of preparation exact information about cost price and other necessary information for decision making. Traditional systems mainly divide the existing costs in organizations into two groups – Direct costs and periodic costs – and they only consider the direct costs in calculating the cost price. But in making a decision they need to use both of them, direct and periodic costs. Therefore, based on traditional methods, analysis of the improvement of activities and methods for decreasing the costs won't be possible.

5- Traditional systems consider the advantages obtained from changing the processes and the improvement of methods as saving money in the labor force. Therefore, they don't show the improvement of functions in operational processes.

6- Traditional costing systems do not show the real information about operational process and costs. These systems only consider the costs which are easily identifiable in calculating the costs price, and indirect costs don't play any roles in calculating cost price.

In addition to shortcomings of the traditional system, the growth of competition and the complexity of technology have intensified the necessity of using new costing systems. Since the organizations need to access correct information about costs to price products and services, it is obvious that traditional systems are not efficient enough because of their nature.

The researcher believes that despite the disadvantages of the traditional methods, they are used so far especially in developing countries. This may be due to the lack of great development in technology such as developed countries or perhaps there are no large and complex institutions, which

makes the traditional methods suitable, or lack of fierce competition, or lack awareness of the managers the importance of modern methods and their benefits, or the inadequacy of modern methods of the environment of developing countries, which makes the situation needs further studies.

Thus, the management accounting profession is seeking to develop the tools and information for planning, monitoring and controlling enterprise performance and effective decision support. Besides, the fundamental goals of the management accounting system are; computing product costs, determining the consequences of a product's profitability, and controlling budgets and costs. So, several management accounting techniques and tools have been launched so as to assist managers in determining the product cost. ABC is considered the most well-known management accounting practices which focus on the firm's activities and the costs of such activities¹.

2.1.7 Activity Based Costing System (ABC):

2.1.7.1 The history of Activity Based Costing

In the late 1960s and early 1970s, accounting writers pointed to the relationship between activity and cost. But in the 1980s, because of the reflection of weaknesses and shortcomings of common accounting systems in giving exact cost information, this relationship was focused on more by universities and occupational centers. This consideration was mainly on the basis of three basic structures²:

The first structure was a new change in the world which occurred in different countries especially Japan to introduce modern technology and new productive mechanisms.

The second structure was that in the 1980s, the conceptual philosophy of many company managers changed a lot and in addition to productivity, competition in the world level, and the growth of customers' satisfaction, the basic goal of managers was to emphasize the quality control of products and to decrease the costs.

The third structure was that some of the accounting writers explained new product situation, various technology roles, and new viewpoints to the manager. They claimed that traditional systems of industrial accounting and managers are not only responsible for managers' needs but also their obtained information causes the managers to make wrong decisions. As a result, the writers tried to introduce a new system called Activity Based Costing.

¹ Mohamed Fathy Elshahat, Op. Cit., p207.

² Fatemeh Kowsari, Op. Cit., pp. 2499-2500.

The idea behind activity-based costing is that cost objects, which can be products, services, job, units, batches, customers, or anything the management accounting is trying to cost, consume activities. In turn, activities consume resources. Activity drivers measure the activity consumed, and resource drivers measure the resources consumed. Activity-based costing system tries to determine what is really driving costs and charge a cost object for only the overhead it actually consumes¹.

ABC systems calculate the costs of individual activities and assign costs to cost objects such as products and services on the basis of the activities undertaken to produce each product or service².

In activity-based costing, an activity is an event that causes the consumption of overhead resources. An activity cost pool is a “bucket” in which costs are accumulated that relate to a single activity measure in the ABC system. An activity measure is an allocation base in an activity-based costing system. The term cost driver is also used to refer to an activity measure because the activity measure should “drive” the cost being allocated³.

Accordingly, Activity-based costing (ABC) assigns manufacturing overhead costs to products in a more logical manner than the traditional system, Activity-based costing attached overhead to activities which are the real cause of the overhead, then rationally allocated to end products using several cost drivers.

The objectives of Activity Based Costing are discussed below⁴:

- To remove the distortions in the computation of total costs as seen in the traditional costing system and bring more accuracy in the computation of costs of products and services.
- To help in decision making by accurately computing the costs of products and services.
- To identify various activities in the production process and further identify the value-adding activities.
- To distribute overheads on the basis of activities.
- To focus on high-cost activities.
- To identify the opportunities for improvement and reduction of costs.
- To eliminate non-value-adding activities.

¹ John G. Burch, cost and management accounting a modern approach, West Publishing Company, United States, 1994, p 445.

² Alnoor Bhimani, et al., Op. Cit., p341.

³ Eric W. Noreen, Peter C. Brewer, Ray H. Garrison, Op. Cit. p237.

⁴ The Institute of Cost Accountants of India, Op. Cit. p 409.

Activity-Based cost system is a two-stage process, in the first stage it traces overhead costs to activities, and the second stage consists of assigning costs to the product¹:

First-stage procedure: in the first stage activities are identified, costs are associated with individual activities and activities and their associated costs are divided into homogeneous sets. Recall that an activity is a work performed within an organization. Thus activity identification requires a listing of all the different kinds of work, such as materials handling, inspections, process engineering, and product enhancement. A firm may have hundreds of different activities. Once an activity is defined, the cost of performing the activity is determined (by using direct tracing and resource drivers). At this point, the firm could determine the activity driver associated with each activity and calculate individual activity overhead rates. For the average setting, this could literally produce hundreds of overhead rates, a cumbersome method of assigning overhead to products.

To reduce the number of overhead rates required and streamline the process, activities are grouped in homogeneous sets based on similar characteristics: (1) they are logically related and (2) they have the same consumption ratios for all products. Costs are associated with each of these homogeneous sets by summing the costs of the individual activities belonging to the set. The collection of overhead costs associated with each set of activities is called a homogeneous cost pool. Since the activities within a homogeneous cost pool have the same consumption ratio, the cost variations for this pool can be explained by a single activity driver. Once a cost pool is defined, the cost per unit of the activity driver is computed by dividing the pool costs by the activity driver's practical capacity. This is called the pool rate. Computation of the pool rate completes the first stage. Thus the first stage produces five outcomes: (1) activities are identified, (2) costs are assigned to activities, (3) related activities are grouped to form homogeneous sets, (4) the costs of grouped activities are summed to define homogeneous cost pools, and (5) pool (overhead) rates are computed.

Second-stage procedure: in the second stage, the costs of each overhead pool are traced to products. This is done using the pool rates computed in the first stage and measures of the amount of resources consumed by each product. This measure is simply the quantity of the activity driver used by each product.

¹ Don R. Hansen, Maryanne M. Mowen, Management Accounting, South-Western College Publishing, The United States of America, 1997, pp121-122.

The two-stage allocation process can be used as a framework to summarize the different approaches to assign overhead costs to products. The framework applies to both traditional and ABC systems. But traditional costing system uses a single-cost driver, while ABC system uses multi-cost drivers.

Steps for Implementing Activity-Based Costing¹:

1. Define activities; activities cost pools, and activity measures.
2. Assign overhead costs to activity cost pools.
3. Calculate activity rates.
4. Assign overhead costs to cost objects using the activity rates and activity measure.
5. Prepare management reports.

Activity-based costing defines five levels of activity-unit-level; these levels are described as follows²:

1. Unit-level activities; are performed each time a unit is produced. The costs of unit-level activities should be proportional to the number of units produced.
2. Batch-level activities; are performed each time a batch is handled or processed, regardless of how many units are in the batch. Costs at the batch level depend on the number of batches processed rather than on the number of units produced, the number of units sold, or other measures of volume.
3. Product-level activities; relate to specific products and typically must be carried out regardless of how many batches are run or units of product are produced or sold.
4. Customer-level activities; relate to specific customers and include activities such as sales calls, catalog mailings, and general technical support that are not tied to any specific product.
5. Organization-sustaining activities; are carried out regardless of which customers are served, which product are produced, how many batches are run, or how many units are made.

2.1.7.2 The Advantage of Activity Based costing:

ABC system offers the following advantages³:

¹ Eric W. Noreen, Peter C. Brewer, Ray H. Garrison, Op. Cit. p241.

² Ibid, p 238.

³ Mr. Shaban E. A. Salem, Dr. Shabana Mazhar, The Benefits of the Application of Activity Based Cost System, Journal of Business and Management, Vol. 16, No. 11, 2014, India, p 41.

- ABC system brings accuracy and reliability in product cost determination by focusing on cause and effect relationship in the cost incurrence. It recognizes that is activities which cause costs, not products and it is product which consumes activities.
- In advanced manufacturing environment and technology where support functions overhead constitute a large share of total costs, ABC system provides more realistic product costs.
- ABC system identifies the real nature of cost behavior and helps in reducing costs and identifying activities which do not add value to the product. With the ABC system, managers are able to control many fixed overhead costs by exercising more control over the activities which have caused these fixed overhead costs. This is possible since the behavior of many fixed overhead costs in relation to activities now become more visible and clear.
- ABC system uses multiple cost drivers, many of which are transaction based rather than product volume. Further, the ABC system is concerned with all activities within and beyond the factory to trace more overheads to the products.
- ABC system traces costs to areas of managerial responsibility, processes, customers, department besides the product costs.
- ABC system improves greatly the manager's decision making as they can use more reliable product cost data.
- ABC system helps usefully in fixing selling prices of products as more correct data of product cost is now readily available.
- ABC system products reliable and correct product cost data in the cause of greater diversity among the products manufactured such as low-volume products, high-volume products. Traditional costing system is likely to bring errors and approximation in product cost determination due to using arbitrary apportionment and absorption methods.
- ABC system provides cost driver rates and information on transaction volumes which are very useful to management and performance appraisal of responsibility centers. Cost driver rates can be used advantageously for the design of new products or existing products as they indicate overhead costs that are likely to be applied in costing the product.
- ABC system provides not only a base for calculating more accurate product cost but also a mechanism for managing costs.

The researcher believes that these benefits result from the use of more than one engine which makes calculating the cost of the product more accurate.

2.1.7.3 The ABC View of Resources Falls Short:

The activity-based costing model, though intrinsically sound for allocating costs, falls short of being the definitive method in eight significant ways regarding resource costing¹:

1. A homogeneous measure of capacity is not incorporated.
2. Interrelationships among resource elements (e.g., output quantities, utilization statistics) are only indirectly expressed.
3. The initial inherent nature of cost (i.e., the fixed and proportional characteristics of the costs given the capacity, skill, technology, operating characteristics of the resources deployed) is not reflected.
4. Excess and idle capacity is not properly accounted for.
5. Interrelationships between resource pools (i.e., the grouping of related resource elements into a pool) are only indirectly expressed.
6. The changing nature of cost, as it relates to the cost model, is not reflected.
7. Fully burdened resource costs are not provided.
8. Inferior information is supplied for effective resource management and certain strategic decisions.

2.1.7.4 The Disadvantage of Activity Based costing:

Though this system is quite effective, it suffers from some limitations. These limitations are given below²:

- Activity Based Costing is a complex system and requires a lot of records and tedious calculations.
- For small organizations, the traditional cost accounting system may be more beneficial than Activity Based Costing due to the simplicity of operation of the former.
- Sometimes it is difficult to attribute costs to single activities as some costs support several activities.
- There is a need for trained professionals who are limited in number.
- This system will be successful if there is a total support from the top management.
- A substantial investment of time and money is required for the implementation of this system.

Evan and Ashworth claimed that although more overhead costs can be allocated straight to products via ABC's multiple activity cost pools, some

¹ David E. Keys and Anton van der Merwe, THE CASE FOR RCA: EXCESS AND IDLE CAPACITY, Cost Management [formerly Journal of Cost Management], Northern Illinois University in DeKalb, 2001, p 2.

² The Institute of Cost Accountants of India, Op. Cit. p 411.

overhead cost remained to be dispensed with the help of some arbitrary volume-based cost driver like the machine or labor hours. Datar and Gupta indicated that the disadvantage of Activity-based costing (ABC) was that it increased the frequency of errors in product cost measurement through increase in the number of cost pools and improvement in the specification of cost-bases. Another disadvantage mentioned by Noreen is that Activity based costing (ABC) implementation provided beneficial results only under specific conditions. Another study conducted by McGowan and Klammer suggested that many Activity-based costing (ABC) adopters had abandoned their implementations and this raised concerns on the potential impact of Activity-based costing (ABC) on performance¹.

Moreover, ABC requires a significant amount of time and cost to implement. If the implementation is to be successful, substantial support is needed throughout the firm. Management must create an environment for change that overcomes a variety of individual, organizational, and environmental barriers, such as the following shows in table (2.1.2):

Table (2.1.2) Barriers to implementing ABC System

Individual Barriers	Organizational Barriers	Environmental Barriers
Fear of change	Territorial issues	Employee (often union) groups
A shift in status	Hierarchical issues	Regulatory agencies
The necessity to learn new skills	Corporate culture issues	Financial accounting mandates

Source: Michael R. Kinney, Cecily A. Raiborn, Cost Accounting Foundations and Evolutions, 8 th ed., Cengage Learning, 2011, U.S.A, p 131.

To overcome these barriers, a firm must recognize that these barriers exist, investigate their causes, and communicate information about the “what,” “why,” and “how” of ABC to all concerned parties. Top management must be involved with, and support, the implementation process; a shortfall in this area will make any progress toward the new system slow and difficult. Additionally, everyone in the company must be educated in new terminology, concepts, and performance measurements. Even if both of these conditions (support and education) are met, substantial time is needed

¹Devinaga Rasiah, Op. Cit., pp. 95-96.

to properly analyze the activities occurring in the activity centers, trace costs to those activities, and determine the cost drivers¹.

Another problem with ABC is that it does not conform specifically to GAAP. ABC suggests that some nonproductive costs (such as those for R&D) should be allocated to products, whereas certain other traditionally designated product costs (such as factory building depreciation) should not be allocated to products. Therefore, most companies have used ABC for internal reporting but continue to prepare their external financial statements with a more traditional system—requiring even more costs to be incurred. As ABC systems become more accepted, more companies could choose to refine how ABC and GAAP determine product cost to make those definitions more compatible and, thereby, eliminate the need for two costing systems².

The researcher believes that the reason for the spread and the appearance of the ABC system is that it is the first system to appear after the traditional cost systems and tried to address the problems of traditional cost systems and an attempt to meet the requirements of technological development. And naturally, this system also has defects that have been attempted to address with new systems such as Time-Driven Activity-Based Costing (TD-ABC). Meanwhile, at the same time as the ABC system was deployed in Germany and some European countries, the GPK system was used as a simple warning for this system;

2.1.8 German Cost Accounting (GPK):

2.1.8.1 Background of GPK

Grenzplankostenrechnung (GPK), which roughly translates to “flexible standard costing,” is one of the most widely used costing systems in Germany and other European countries and is best described as a direct or variable costing system. Companies that use GPK make a significant effort to identify cost behavior, traceability, relevance to decision making, and cost period measurement³.

German cost accounting systems developed in response to a financial accounting system that was highly defined by government reporting

¹ Michael R. Kinney, Cecily A. Raiborn, *Cost Accounting Foundations and Evolutions*, 8 th ed., Cengage Learning, 2011, U.S.A, p 131.

² *Ibid*, p 131.

³ *Carl S. Smith, STIHL MOVES TOWARD THIS COSTING SYSTEM IN THE UNITED STATES, STRATEGIC FINANCE I April 2005, p 36.*

requirements but wasn't especially helpful to managers in supplying information needed to manage the business. Shortly after World War II, H.G. Plaut developed a new form of cost accounting called Grenzplankostenrechnung (GPK in English), which may be translated as Flexible Analytic Cost Planning and Accounting, sometimes referred to as flexible standard costing. Plaut and his consulting company deployed the technique to many manufacturing companies in Germany and German-speaking countries as well as to a number of significant service organizations including banks and the postal system. Prof. Dr. Wolfgang Kilger was influential in developing the theory of GPK, and Prof. Dr. Paul Riebel created a highly sophisticated contribution margin accounting method called Einzelkosten und Deckungsbeitragsrechnung as a competing model. Both models are integrated with modern German cost accounting systems. Indeed, the resulting GPK methodology has become the standard for cost accounting in Germany¹.

GPK was first established in German-speaking countries in the late 1940s in an economy dominated by manufacturing. The approach's foundational principles are more than fifty years old. The most important of these are²:

- An entirely quantity-based approach to cost modeling
- A detailed cost center structure providing a differentiated view of resources
- Emphasizes planning and establishing annual standards
- Categorizing inputs into fixed and proportional in nature in relation to their associated output
- A multi-level, multi-dimensional contribution margin reporting for profitability analysis. GPK is still widely accepted in German business practice due to the benefits it provides
- Transparency for planning and control of costs in the different departments
- All necessary information for many crucial management decisions like make-or-buy, capacity planning as well as sales & production planning.

The primary components of GPK include Grenzkosten and Plankosten. The Grenzkosten component is a marginal costing method that assigns

¹ PAUL A. SHARMAN, German Cost Accounting, STRATEGIC FINANCE, December 2003, <http://sfmagazine.com/wp-content/uploads/sfarchive/2003/12/Bring-on-German-Cost-Accounting.pdf>.

² PETER VON ZIMMERMANN AND DAWN SEDGLEY, GPK: CRACKS IN THE SILVER BULLET?, Cost Management Accounting, Audit & Corporate Finance Library, July/August 2010, https://www.altavia.com/library/private/CostMgmt_2010_GPK_Cracks_In.pdf. p1.

proportional costs to products or services. This idea is similar to contribution accounting where revenues and proportional costs are traced to different segments of a company. Plankosten involves using the planned cost (i.e., cost budgets) to control costs in each cost center. Further, a GPK system splits fixed costs from proportional costs when comparing budgeted versus actual costs of cost targets¹.

It is clear from the above that the most important feature of this system its name Flexible Analytic Cost Planning which represents the main goals of this system which are planning cost and analyzed it through detailed cost center structure, categorizing inputs into fixed and proportional, multi-level, multi-dimensional contribution margin reporting for profitability analysis, which help planning and establishing annual standards, and that what lead to provide all necessary information for many crucial management decisions.

2.1.8.2 Core elements of GPK

According to German Professors Dr.'s Friedl, Kuepper and Pedell, the fundamental structure of GPK consist of four important elements²:

1. Cost-type accounting,
2. Cost center accounting,
3. Product [service] cost accounting, and
4. Contribution margin accounting for profitability analysis.

1- Cost-type accounting separates costs like labor, materials, and depreciation, followed by each cost account then being broken down into fixed and proportional costs along with the assignment of these cost accounts to cost centers.

2- Cost center accounting is the most important element in GPK. A cost center can be defined as an area of responsibility that is assigned to a manager who is held accountable for its performance. It is common to have from 200 to over 2,000 cost centers in a typical GPK adopter organization.

GPK distinguishes two types of cost centers:

a- Primary Cost Centers - are cost centers that provide output directly consumed by a saleable product or service is considered to be a primary cost center. Related to the service or manufacturing process.

b- Secondary Cost Centers - are cost centers that incur costs but exist to support the functions of the primary cost centers. Typical secondary cost

¹ Rosanne Weaver, Robert W. Rutledge, Khondkar E. Karim, Is GPK Right for U.S. Companies? Possibility of Its Application in Bangladesh, ASA University Review, Vol. 4, No. 2, 2010, p94.

² GUNTHER F. RIEDL, HANS - ULRICH K. ÜPPER, BURKHARD PEDELL, Relevance Added: Combining ABC with German Cost Accounting, STRATEGIC FINANCE, Vol. 86 (12), 2005, p57.

centers include: information technology (IT) services and; human resources (HR) areas that offer hiring and training functions.

With the GPK marginal costing approach, primary costs centers outputs consumed by products/services reflect direct causal relationships, as well as causally-linked costs originating from supporting secondary cost centers that primary cost centers need to function. As such, both of these causally-linked outputs—if proportional in nature—will vary with product/service output volume (albeit the secondaries only indirectly) and are reflected in the appropriate product/service contribution margin in the P&L.

3- Product/Service cost accounting also referred to as Product Costing, is where all of the assigned costs that are product related will be collected in the GPK costing model. In GPK's purest marginal form only proportional costs are assigned to products or services, but as indicated above a compromise is often struck by also assigning product-related fixed costs.

4- Profitability management is the final component that completes the marginal costing system by adding in the revenues, cost-to-serve and common fixed costs along with the product/service cost accounting information discussed above. The GPK structure allows for a more detailed analysis because of the multi-dimensional contribution margin view. This type of multi-level profitability management not only supports short-term decision making such as pricing decisions or internal pricing transfers, but it also provides relevant costing information for long-term decisions.

2.1.8.3 Consumption and Cost Behavior

Cost behavior is the way costs respond to changes in volume or activity is a factor in almost every decision managers make. Managers commonly use it to analyze alternative courses of action so they can select the course that will best generate income for an organization's owners and maintain liquidity for its creditors¹.

Coming to terms with consumption and the behavior of costs is arguably the most crucial condition for any managerial accounting method. Lack of clarity in this understanding adversely affects the approach's ability to deliver on the other criteria, including decision support. In particular, this criterion is concerned with accurately reflecting the cost structure of the enterprise and a consistent treatment of consumption and related cost behavior as resources consumed in enterprise operations. Traditional approaches are limited because they usually examine cost behavior as it relates to changes in production volume or sales levels. "ABC highlighted this problem, but it faltered in implementation by not recognizing the role

¹ Susan V. Crosson, Belverd E. Needles, Managerial Accounting, 8th ed., U.S.A, 2008, p 246.

and importance of resources”. GPK defines resource consumption by quantities, and regards costs as being either fixed or as proportional relative to outputs¹.

What have been mentioned can be summarized it in one point which is the main difference between approaches is Traditional system examine cost behavior according to production volume, while ABC system examine cost behavior according to activity, and GPK system examine cost behavior according to resource consumption.

GPK assigns cost (resource) elements to cost (resource) centers. Cost centers are defined by the following criteria²:

1. The center must have an identifiable, measurable output and identifiable, separable costs specific to the output being produced;
2. The outputs must be repetitive and subject to planning;
3. The costs, technology, resource type, and work in the center must be homogeneous;
4. The cost center’s size should be limited, and it should be geographically compact; and
5. A single manager should have responsibility for the cost center, although a single manager may be responsible for more than one cost center.

Resources can be included in the pool as primary costs, via direct tracing, or as secondary costs, via driver allocation. In the cost center, the cost elements are divided into fixed and variable components. Variable costs vary proportionately with the cost center output. This level of disaggregation allows the costs to be properly characterized depending on the context. Cost centers can be primary or support with respect to the production of goods and services. For example, a maintenance cost center might support a “primary” machining cost center directly involved with the production of goods. The output measure of the “secondary” production-supporting cost center is used to assign costs from the support center, such as maintenance, to the cost centers it supports³.

Proportional support-center costs are assigned to the consuming cost centers at a standard rate per actual amount of output used. Fixed support-center costs are assigned at a standard rate determined by the practical capacity of

¹ Rosanne Weaver, Robert W. Rutledge, Khondkar E. Karim, Op. Cit., p 97.

² Lawrence P. Grasso, Are ABC and RCA Accounting Systems Compatible with Lean Management? Management Accounting Quarterly, 2005, VOL. 7, NO. 1, p 16.

³ Ibid, p16.

the committed resources. The consuming cost centers are charged this standard rate for the capacity that has been budgeted for the consuming center. Excess capacity of fixed resources is not allocated. The fixed/proportional character is maintained for costs transferred from support centers to primary cost centers. Variable primary-center costs are assigned to products or services based on the primary cost centers output measure. Fixed primary-center costs are assigned to products or product lines to generate contribution income statements, but fixed primary costs are not assigned to individual units of product or service. The result is an incremental contribution view of cost data designed to support short-term decision making. The fixed/variable designation of costs and individual manager responsibility for cost centers supports the creation of flexible budgets and the use of variance analysis for operational feedback and operational cost control¹.

2.1.8.4 BENEFITS OF GERMAN COST ACCOUNTING GPK²:

- Make-vs.-buy analysis; because GPK allows companies to break down the cost of their products to any level of aggregation, it's easier to do make-or-buy analyses for products made at various locations worldwide.
- Capacity decisions; Separating fixed and proportional costs are crucial for deciding how to use or whether to eliminate capacity.
- Cost control; Separating fixed and proportional costs also allow cost center variance analysis, comparing target (flexible) costs to actual costs. This analysis is much more accurate than comparing planned costs with actuals, which is still common in the U.S. The separation of fixed and proportional costs during planning provides the opportunity to identify where costs can be reduced.
- Transparency for cost information; GPK system provides cost information that's more reliable and easier to get, but these benefits depend on a good IT system. The system must be able to provide the data quickly and reliably.
- Sales and production planning; GPK-type information can help in controlling sales and production planning, partially by using contribution margin (CM—revenue minus costs). Of course, to be able to compute CM, it's imperative that we can distinguish between fixed and variable costs. For a single product, the CM provides the short-term lower limit for the price. Any item that can be sold for more than this value adds profit that can be used to cover fixed costs. (The German term for contribution margin is

¹ Ibid, p16.

² KIPR K. RUMWIEDE, Rewards and Realities of German Cost Accounting, Annual Conference Topic, Strategic Finance magazine, 2005, pp. 30-31.

translated as “covering contribution.”) Moreover, the contribution margin is especially important in managing production “bottlenecks.” Many production facilities have capacity limits that are below the salable quantity for their products. In this case, the “absolute” contribution margin; in dollar per ton or dollar per piece, and the production time per piece, in minutes per ton or minutes per piece, lead to so-called “relative” or “bottleneck-related” contribution margins, such as dollar per minute, at the restricted work center. With these figures, better decisions can be made about which products to produce to optimize the contribution margin for the whole company.

2.1.8.5 Disadvantage of GERMAN COST ACCOUNTING GPK:

The problem for GPK, however, goes beyond the mere application of scope. Its preference for direct resource output assignment faces both practical and cost-benefit challenges. Its emphasis on the correct direct assignment of outputs to the exclusion of the analytical/process view breaks down in white-collar areas where people and machine times can only be accurately recorded at significant cost. The process view, popularized by activity-based costing (ABC), provides an elegant solution in this regard by focusing on the processes the resources perform. GPK does not provide a process view of costs. In addition to a process/activity as a cost objective, we would add to the improvements required in GPK two more points. The first relates to the treatment of fixed costs. GPK would typically calculate standards based on planned output or practical capacity for the fiscal period. This leads to the spreading of fixed costs-similar to full absorption-and related pitfalls as well as unnecessary complexity in variance analysis. From a purist perspective, GPK would pre-assign actual fixed costs based on planned volume and planned product mix at the beginning of the fiscal period and then function as a direct costing system for the rest of the year¹.

Shorter product life cycles have put pay to this pre-assignment of fixed costs; consider the high tech industry where as much as eighty percent of products that will be sold at the end of the fiscal period do not yet exist at the time budgeting/planning and the pre-assignment of fixed costs occur. GPK users that still follow this path in practice are few and far between. The second point concerns the lack of throughput margins in GPK. GPK is difficult to fault on the multiple margins that it traditionally provides. This might explain why TOC's “totally variable” cost concept was greeted with much less fanfare in Germany than in the US, where traditional standard costing information is clearly deficient when it comes to causality and accuracy. Although TOC has not enjoyed the success in Germany that it did

¹ PETER VON ZIMMERMANN, DAWN SEDGLEY, Op. Cit., p4.

in the US throughput information is clearly high up on the totem pole when it comes to optimization related to short-term decisions involving constrained resources. In GPK's multiple margins the first is typically a contribution margin that takes into account direct material and other product related direct costs that result in cash outflows (e.g., external services). GPK does not provide a margin that reflects all incremental costs for throughput within the relevant range, i.e., that also includes all incremental cash flows in secondary/support areas¹.

Despite the disadvantages of GPK system, most German companies are still using it which suggesting that its benefits outweigh its disadvantages.

2.1.9 The differences between GPK & ABC:

Surprisingly underappreciated by the relevant, the most striking difference in German accounting systems compared to those in the US is the use of a dual-cycle accounting system. One cycle is used for financial accounting, the second one for managerial accounting. The use of two separated ledgers (in German usually denoted as accounting cycles as the term ledger is only used in financial accounting) based on different databases, was suggested by Eugen Schmalenbach. The cycles may work with different figures².

A typical feature of the managerial cycle is the additional use of imputed costs. For example, depreciations in the management accounting cycle might be calculated differently from the financial accounting cycle (i.e. with different useful life assumptions or with different depreciation methods). Using adjusted figures helped to overcome the fallacy that in financial accounting some data reflected the tax law requirements rather than the reality of operations, which should be the basis for management decisions. However, the last major revision of accounting standards in Germany 2009 reduced the relevance of financial accounting for tax accounting significantly. In the US, an integrated accounting system with only one cycle is standard, and therefore the same figures are used for financial and for management information³.

As with ABC systems, GPK systems assign nonmanufacturing costs such as marketing, selling, and research and development to products where appropriate. GPK cost centers are essentially activity centers in that each has

¹ Ibid, p4.

² Karl Zehetner, Sebastian Eschenbach, CLOSING THE GAP BETWEEN U.S. AND GERMAN MANAGERIAL ACCOUNTING, Humanities and Social Sciences Review, FH Burgenland University of Applied Sciences, Austria, VOL. 07(02), 2017, p 463.

³ Ibid, p 463.

a measurable output that must be the result of some activity. As opposed to the activity-centric view in ABC, the resource-centric view in GPK results in much greater granularity in GPK systems. For example, a single activity cost pool in an ABC system for an activity that draws resources from several departments or areas would require multiple cost centers in a GPK system. ABC systems assign resource elements to activity cost pools based on resource drivers. Once this stage-one assignment is made, all resources in the activity cost pool are assumed to take on the behavior of the activity cost driver. For example, all the resources in a setup activity pool would be considered variable with respect to a number of setups or setup hours regardless of the committed or flexible nature of the underlying resources¹. Cooper and Kaplan are not concerned with this “distortion” because they consider ABC a long-term consumption model, but they do maintain that the unused capacity of committed resources should be excluded when determining activity rates. In practice, many ABC implementations fail to account for the unused capacity of committed resources. This failure may be due to the lack of attention given to the nature of the underlying resources. At its heart, GPK is an expenditure model, but it also explicitly considers capacity and usage of committed (fixed) resources. For proportional (variable) costs, expenditure and consumption are assumed to match. On the other hand, GPK is limited to using volume-based resource drivers. All resource allocations are made based on measures of cost center output. Non-volume-based cost drivers, such as complexity, are not used. This means that costs with non-volume-related drivers either cannot be allocated in a GPK system or are characterized as fixed with respect to a volume-based driver².

The differences between GPK & ABC can be summarized in the table (2.1.3) below;

Table (2.1.3) The differences between GPK & ABC

	ABC	GPK
The information	focuses on long term decisions	focuses on short-term decisions
The cost drivers	cost pools have an activity-centric view	cost pools have a resource-centric view
Allocation of equipment cost	divide total equipment cost by a variable amount of activity	equipment cost is divided by a “normalized capacity” that is the same

¹ LAWRENCE P. GRASSO, Op. Cit., p 16.

² Ibid, p 17.

		every year (which shows idle capacity)
Profitability analysis	Profitability is not analyzed by groups	Profitability is analyzed by groups and “layers” on profit-and-loss statements for each product
Allocation of costs	allocates all the costs required to products	allocates only variable cost to products

Source: prepared By Researcher

The researcher presented in this section, the traditional cost system, activity based system and GPK. Traditional cost system to study the historical development of systems. Which as a result of the technological development became unsuitable, and does not provide adequate information, resulting in the emergence of the ABC system in the USA, and GPK system in Germany, the ABC system has been deployed, but it also has many flaws, which has caused many companies to retreat from its application. At the same time in Germany, the GPK system has been developed, which also has some flaws. Since the emergence of these two systems appeared many systems, but the focus of this study of these two systems because the study deals with the resource consumption accounting system which consists of those two systems.

Section Two

Resource Consumption Accounting

2.2.0 Introduction

This section concerns Resource Consumption Accounting system, reviewing its concept, philosophy, the features, pillars, principles, advantages, disadvantages, comparing RCA features with other costing techniques.

2.2.1 Background

There has been an extensive debate in recent years over the extent to which management accounting is changing. Johnson and Kaplan (1987) argued that management accounting had not changed since the early part of the twentieth century and had lost its relevance for the purpose of informing managers' decisions. Since then, and possibly in response to these criticisms, a number of innovative management accounting techniques have been developed across a range of industries. These techniques have been designed to prop up modern technologies and management processes, and the search for a competitive advantage to meet up the challenge of global competition. These recent techniques, it has been argued that, have affected the entire process of management accounting and have shifted its spotlight from a simple role of cost determination and financial control to a sophisticated role of creating value through improved exploitation of resources¹.

Initially, Resource Consumption Accounting (RCA) had emerged as a management accounting approach beginning around 2000 and was subsequently developed at CAM-I (The Consortium of Advanced Management, International) in a Cost Management Section RCA interest group commencing in December 2001. Over the next seven years, RCA was refined and validated through practical case studies, industry journal publications, and other research papers. In 2008, a group of interested academics and practitioners established the RCA Institute to introduce RCA to the marketplace and raise the standard of management accounting knowledge by encouraging disciplined practices. By July 2009, Professional Accountants in Business (PAIB) Committee of International Federation of Accountants (IFAC) recognized Resource Consumption Accounting in the International Good Practice Guidance (IGPG) publication called Evaluating and Improving Costing in Organizations and its companion document, evaluating the Costing Journey: A Costing Levels Continuum Maturity Model. The guide focuses on universal costing principles and with the

¹ Shah Kamal, Op. Cit., p 13.

Costing Levels, Maturity Model acknowledges RCA attains a higher level of accuracy and visibility compared to activity-based costing for managerial accounting information when the incremental benefits of RCA's better information exceed the incremental administrative effort and cost to collect, calculate and report its information. As stated in the International Good Practice Guidance, A sophisticated approach at the upper levels of the continuum of costing techniques provides the ability to derive costs directly from operational resource data or to isolate and measure unused capacity costs. For e.g., in the RCA approach, resources and their costs are considered as foundational to robust cost modeling and managerial decision support, because an organization's costs and revenues are all a function of the resources and the individual capacities that produce them¹.

Resource is an economic or productive factor required to accomplish an activity, or as means to undertake an enterprise and achieve desired outcome².

Consumption is the process in which the substance of a thing is completely destroyed, used up, or incorporated or transformed into something else. Consumption of goods and services is the amount of them used in a particular time period³.

Accounting is a systematic process of identifying, recording, measuring, classifying, verifying, summarizing, interpreting and communicating financial information⁴.

Resource Consumption Accounting (RCA) is formally defined as a dynamic, fully integrated, principle-based, and comprehensive management accounting approach that provides managers with decision support information for enterprise optimization. RCA is based largely on the German management accounting approach (GPK) and uses activity-based drivers to provide additional costing insight when required⁵.

RCA was defined as a system of managerial accounting, which categorizes costs as fixed and variable and supports managerial decision making with real cost data by determining the idle capacity. The definition of the costs of the operating business using the RCA as fixed and variable is to determine the idle capacity, provide the real cost data without distributing the idle

¹ Managerial Accounting Methods and Functions, p27.

² <http://www.businessdictionary.com/definition/resource.html>

³ <http://www.businessdictionary.com/definition/consumption.html>.

⁴ <http://www.businessdictionary.com/definition/accounting.html>

⁵ SAP ERP FINANCIALS CONTROLLING (CO), A Practical Introduction to Resource Consumption Accounting, 2011, http://www.rcainstitute.org/rcadocuments/SAP_UA_Practical_Intro_to_RCA.pdf.p1.

capacity and the fixed parts analyzing the variable costs to the goods or products, and back up the period of making decision¹.

International Federation of Accountants defines RCA as a developed costing method which enables the opportunity of proportional costing in expenses and benefits from ABC. RCA is defined as a managerial accounting method which supports the decision-making period by providing data. The main idea of the system is that resources are the reasons for all costs and costs occur as a result of a distribution of the resources for an operation (building, equipment, labor)².

RCA is the theory innovation of management accounting taking the resource as the junction; it perfectly unifies Activity-Based Costing ABC and Grenzplan kostenrechnung GPK³. Based on the researcher's view, this is the best definition because it is comprehensive because it illustrates what the system is and what it features from other systems.

Based on the above, the researcher concludes that RCA is a modern management accounting system that combines the advantages of two systems that manage costs by focusing on resources as the cost factor, leading to optimal use of resources, reducing the cost of the product and providing accurate and reliable information in decision making.

RCA combines the German cost management system Grenzplankostenrechnung (GPK) with the cost allocation methods of ABC to form a comprehensive management accounting system that may finally give non-accountants ready information to make decisions. RCA integrates measurement and management of the business into an accounting system that reflects how the company actually operates. Paul Sharman said in an IMA webinar on RCA “For any sort of management system to be effective, you must be able to articulate the plans you intend to execute in exactly the same terms that you measure the results of those plans”⁴.

According to International Federation of Accountants, A sophisticated approach at the upper levels of the continuum of costing techniques provides the ability to derive costs directly from operational resource data or to isolate and measure unused capacity costs. For example, in the RCA approach, resources and their costs are considered as foundational to robust cost

¹ Ercument OKUTMUS, Op. Cit., p 46.

² Ibid, p 47.

³ Sheng Hua Qin, Dong Yan, Op. Cit., p229.

⁴ Shirley A. Polejewski, Resource Consumption Accounting, University of St. Thomas, Minnesota, <https://blog.cengage.com/wp-content/uploads/2014/07/SUMMER-2009.Polejewski.Resource-Consumption-Acct.pdf>, p 3.

modeling and managerial decision support, because an organization's costs and revenues are all a function of the resources and the individual capacities that produce them. RCA was also recognized in a Sustainability Framework Report issued by the International Federation of Accountants (IFAC), for having the capability of helping organizations improve their understanding of environmental (and social) costs through their costing systems and models. This Sustainability Framework highlights RCA under the sub-heading Improving Information Flows to Support Decision and informs readers that proper cost allocation can be built 'directly into the cost accounting system', thereby enhancing an organization's performance for identifying, defining and classifying costs in a useful way¹.

RCA is a sort of new cost accounting method which was pushed in America since 2002, which combined some advantages of GPK and improved ABC. RCA not only inherited the cost accounting idea of ABC, i.e. "activity consumes resources, and product consumes activity", but also absorbed the skill and practical application experience of GPK, i.e. pursuing the consumption of cost to the center of the cost, so it is very meaningful whether for the theory or the practical application².

As RCA is rooted in German cost methods and quantity-based activity-based costing (ABC), it uses a comprehensive management accounting information systems approach that allows the integration of both resource and activity analysis. It is fundamentally resource based, providing cost assignment from resources to cost objects as properly attributable based on causality. Drivers used for cost assignment, however, can be either traditional (e.g. labor hours) or activity based. RCA doesn't force an activity-based assignment where deemed inappropriate, but it uses the cost assignment logic necessary to achieve properly attributable costs. Cost management methods have developed differently in the U.S. than in German-speaking countries. Their evolution has developed on the strength of the American capital markets system giving more emphasis to financial accounting and external reporting. Because of this, U.S. management accounting systems aren't as sophisticated as those in some other developed countries of the world. Thus, American cost management could benefit from integrating some German

¹ Ishaq Inanlou, Mohammad Hassanzadeh, Nasrin Khodabakhshi, Evaluating the Cost of Resource Consumed in the Main Activity of Iran Khodro, Singaporean Journal Of business Economics, And management Studies VOL.2, NO.12, 2014, Iran, p 201.

² Yanhui Wang, et al., Op. Cit., p84.

systems best practices with those of their own. In fact many of the best practices are evidenced by RCA¹.

Resources Consumption Accounting (RCA) emphasizes the fact that cost is caused and can be effectively controlled at the resource level, and recognizes that each resource has ability to create value. Since the capacity resides in resources, managing the capacity and usage of resources is the basis for effectively managing costs².

RCA is based on the cost distribution according to resource consumption, and accounts are made as amount centered. RCA consists of three basics³:

- Resources are regarded as the starting point,
- Cost structure is monitored perpetually, and
- Amount based approach is used in modeling the costs.

RCA essentially retains the resource-centric conceptual foundation and generates incremental expenditure and marginal analyses while also having the capability to generate activity-based, long-term consumption model cost data. The principal operational control and improvement feature of both GPK and RCA systems is flexible budget variance analysis. Direct costs are accumulated for each cost center, and indirect costs are assigned based on planned and actual consumption of outputs of other cost centers. The single output per cost center combined with the committed/proportional cost classification allows the cost center budget to be easily flexed to reflect actual cost center output. In contrast to the dual vertical and horizontal view of ABC, the resource-centric GPK and RCA systems have vertical, resource (cost) views. With their emphasis on having an individual manager responsible for each cost center, GPK and RCA also focus on local rather than system optimization and individual rather than team responsibility⁴.

For decision making, RCA systems can provide marginal cost data to support short-term decision making and can allocate fixed costs on an activity basis to support long-term decision making. RCA systems also can generate activity-based budgets for planning purposes, but this information comes at considerable cost. The benefits of GPK's cost center criteria lead to systems with a vast number of cost centers—400 to 2,000 cost centers in a

¹ B. Douglas Clinton, Sally A. Webber, Here's innovation in management accounting with Resource Consumption Accounting, Strategic Finance, Farmington Hills, Michigan, October 2004, p22.

² Karim Mamdouh ABBAS, VIABILITY OF SOME APPLIED COST SYSTEMS IN MANUFACTURING FIRMS: EGYPT'S CASE, Scientific Papers Series Management, Vol. 15, Issue 1, 2015, EGYPT, p 14.

³ Ercument OKUTMUS, Op. Cit. p 47.

⁴ Ibid, p 47.

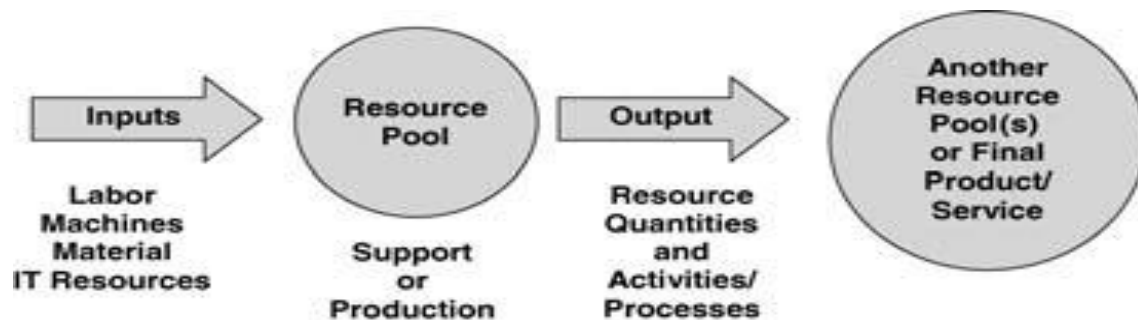
typical system. Once the system is established, costs must be properly assigned to hundreds or thousands of cost centers, and the system must be maintained and updated¹.

Resources Consumption Accounting (RCA) is a quantity-based model, costs in RCA are modeled based on resource flow. Resource costs are classified as fixed or proportional based on the correlation between the input quantities to a resource pool and that pool's output quantities².

2.2.2 Basic Model of an Organization

Any decision support model must focus on modeling the flow of resources throughout the organization. Enterprises organize resources into relatively homogeneous workgroups or resource pools. Each resource pool applies its inputs to produce an output that supports another organizational resource pool or produces a product or service for a customer³. In the simplest form, it looks as illustrated in Exhibit (2.2.1).

Exhibit (2.2.1): Input-Output Modeling of Resource Consumption



Larry White, Resource Consumption Accounting: Manager-Focused Management Accounting, The Journal of Corporate Accounting & Finance, 2009, VOL. 20 (4), p65.

Exhibit (1.2.1) shows that the organization is a set of resources, like materials, labor, machine and IT resources, all those resources consider to be input, then these resources are classified in groups called resource pool. These pools are divided into primary (directly involved with the production) and secondary (supporting) pools (engaged in providing services for other pools). The output will be resource quantities and activities/ processes.

2.2.3 COST OBJECTS IN A RCA MODEL:

¹ LAWRENCE P. GRASSO, Op. Cit. p 17.

² Karim Mamdouh ABBAS, Op. Cit. p 14.

³ Larry White, Resource Consumption Accounting: Manager-Focused Management Accounting, The Journal of Corporate Accounting & Finance, 2009, VOL. 20 (4), p65.

- **Cost Centers:** In an RCA model, a Cost Center delineates a single department and typically represents a single manager's area of responsibility. An entire organization will have many Cost Centers and in some circumstances a manager may be responsible for more than one Cost Center; however it is more the norm to have only one Cost Center (department) per manager. Each Cost Center can have more than one Resource Pool depending on the diversity of that Cost Center's resources and outputs¹.

- **Resource Pools:** A Resource Pool measures the output of a homogenous set of resources and collects information on the inputs (and their costs) required to produce the resources' particular output. In an RCA model, Resource Pools are used to assign costs based on the consumption of resource quantities by other cost objects or receivers².

- **A homogeneous cost pool:** is one in which all the activities whose costs are included in the pool have the same or similar cause-and-effect relationship or benefits-received relationship between the cost allocator and the costs of the activity³.

The consumption relationships can be modeled. A particular Resource Pool's output quantity can be consumed by other Resource Pools in a Resource Pool-to- Resource Pool relationship, consumed by a Business Process cost object, or consumed directly by a final product or services cost object. Resource Pool rates are calculated and used for cost assignments. Rates are divided into Fixed and Proportional rates. Direct output consumption in a Resource Pool-to-Resource Pool assignment is the most common approach to building an RCA model. Excess capacity is always identified to avoid arbitrary and therefore, distorting allocations, which can lead to incorrect decision making⁴.

- **Primary and Secondary Costs⁵:**

The Primary costs of a Resource Pool are the costs of the resources within the Resource Pool or the cost of inputs procured externally and consumed directly in producing the particular output.

Secondary costs of a Resource Pool result from consuming an output from another Resource Pool or Business Process.

¹ SAP University Alliance, A Practical Introduction to Resource Consumption Accounting, 2011, p4, www.altavia.com.

² Ibid, p5.

³ Alnoor Bhimani, et al., Op. Cit. p 139.

⁴ SAP University Alliance, Op. Cit., p5.

⁵ Ibid, p6.

- Fixed and Proportional Consumption and Costs:

In addition to the Primary and Secondary classification of costs, Resource Consumption Accounting will model all resources consumed along with all its associated costs termed as Fixed and/or Proportional ('Variable'). A Fixed consumption relationship exists when the quantity of the input consumed does not vary with the output level of the consuming cost object; therefore, the cost of that input is fixed. A Proportional consumption relationship exists when the quantity of the input consumed changes with the level of output of the consuming cost object¹.

Proportional support-center costs are assigned to the consuming cost centers at a standard rate per actual amount of output used. Fixed support-center costs are assigned at a standard rate determined by the practical capacity of the committed resources. The consuming cost centers are charged this standard rate for the capacity that has been budgeted for the consuming center. Excess capacity of fixed resources is not allocated. The fixed/proportional character is maintained for costs transferred from support centers to primary cost centers. Variable primary-center costs are assigned to products or services, based on the primary cost center's output measure. Fixed primary-center costs are assigned to products or product lines to generate contribution income statements, but fixed primary costs are not assigned to individual units of product or service. The result is an incremental contribution view of cost data designed to support short-term decision making. The fixed/variable designation of costs and individual manager responsibility for cost centers supports the creation of flexible budgets and the use of variance analysis for operational feedback and operational cost control².

- Business Processes:

Business Processes provides analytical insight into resource outputs, such as a particular task within the organization. They are reflective of activities in Activity-based Costing. Activities or Business Processes are used with circumspection in an RCA model. This is because they add another layer of complexity to the cost model when compared to the traditional practice of directly charging the output where it is consumed. Business Processes are used when it is a cost-effective way to capture a Resource Pool's output compared to tracking discrete resource quantities. This may be the case

¹ Ibid, p7.

² Lawrence P. Grasso, Op. Cit., p16.

when dealing with many salaried support areas (e.g. Human Resources, Procurement, or IT departments) ¹.

Use of a Business Process with a production Resource Pool should be limited to where their use provides the required analytical insight into the resources 'output. Business Processes are only used between a providing Resource Pool and a consuming Resource Pool or a providing Resource Pool and a product/service/final cost object. In RCA, Business Processes are not modeled as supporting other Business Processes. The ability to trace resource quantities and capacities would be lost violating the fundamental principle of maintaining clearly traceable and responsive quantity-based cause and effect relationships².

2.2.3 Relationships in A RCA Model:

Secondary costs are entered in quantities with a unit of measure for the provider Resource Pool or Business Process. Secondary input quantities are also divided into Fixed and/or Proportional components. Secondary inputs show all the consumption values for Resource Pool with a consumption quantity from two Secondary sources. All the Secondary consumption relationships are initially valued in 'quantities'. Once the internal rates are calculated, the Secondary quantities will be valued in dollars so that total cost on each cost object is obtained. These consumption relationships are captured in the system in a Provider-Consumer manner to accurately trace consumption. Once the quantities have been valued, the costs are reflected as Secondary costs on the consumer and as recovery of the supplier³.

Resource costs in RCA are monitored by categorizing as primary and secondary costs after assigned in the cost pools. Primary costs are ones occurring in a cost center, therefore the cost center have the primary control on these costs. The secondary costs are defined as the ones which are transferred or directed to a cost center. The secondary costs are explained as the ones that can reflect directly on the consuming object, and occur in the back-up or other resource costs. Consuming cost center, namely the cost center which benefits from the service, has a secondary control on the costs. For example, while the amount of the service demanded from the supplying cost Centre is under the control of the cost center, the rate for each unit and price is not under the control of consuming cost center. This situation

¹ Shirley A. Polejewski, Op. Cit., p 9.

² Ibid, p9.

³ Ibid, p 12.

enables the managers to have responsibilities related to what they can take under control in the cost centers'¹.

The primary costs are ones which are produced in the resource pool while the secondary costs are consist of the ones that support the resource pool and are transferred from the other resource pools. The primary and secondary costs are exposed to another categorization as fixed and variable considering the relation to the output of resource pool. The fixed consumption relation occurs unless the output amount that has been consumed changes with the amount of output that the cost objects consumes, and the cost of this output is stable. Variable consumption relation turns out if the output amount consumed changes with the amount of output, the cost of this output is variable. For instance, the amortization of a machine that takes place in a resource pool is stable because it does not change with the level of cost output. However, the electricity cost of this machine will be variable because kW per hour is different from the direct machine usage, namely from the output level².

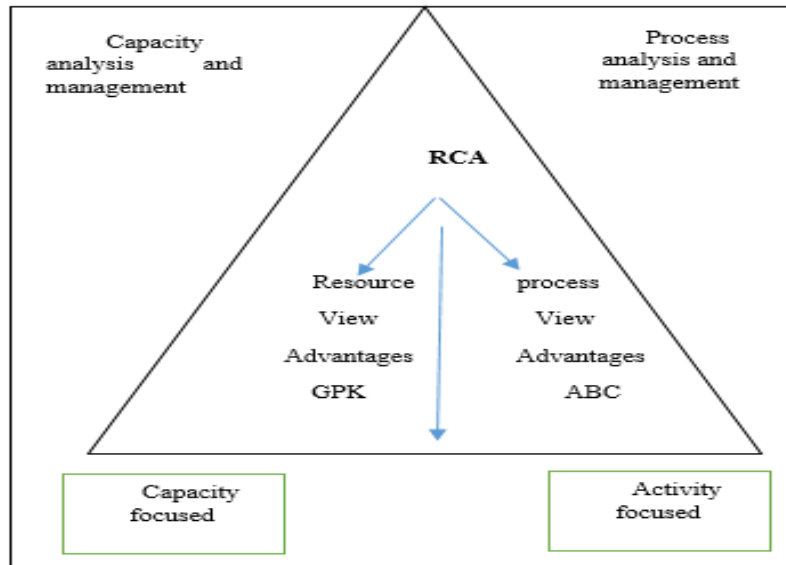
Depending on what management decides and what level of detailed information he requires and to what extent the tracking and identification of countable activities (expressible by quantities) is possible, managers may be able to identify activities and resources. This is one of the positive points of this technique and prevents any cost allocation which is harmful to products costing³.

Exhibit (2.2.2): Philosophy of resource consumption accounting

¹ Ercument OKUTMUS, Op. Cit. p 48.

² Ibid, p 49.

³ Mahmoud Rahimi, et al., Op. Cit., p 534.



Source: Mahmoud Rahimi, et al., Resource Consumption Accounting: A New Approach to Management Accounting, Academy of Business & Scientific Research, Vol. 3 (4), 2014, p 535.

Exhibit (1.2.2) illustrated that RCA used the advantages of the two methods ABC method (which identify activities in organizations and focus in process analyses) and GPK (which tracking the variable costs and focus in capacity analyses). This method could take advantage of both methods and merge GPK resource perspective with ABC activity perspective.

RCA provides financial information clearly linked to operational data, this yields clear decision making power encompassing all aspect of business and operations not restricted by the design of the general ledger processes and chart of accounts. RCA focuses on resources with the help of activity-based costing (ABC) and activity-based methods (ABM), variable costing, absorption costing, actual costs, standard costs, segmented income statements, activity-based resource planning, primary and secondary costs. RCA is typically a part of an enterprise resource planning (ERP) system. It integrates the best combination of cost management principles for creating information for enterprise optimal decision. Benefits of an ERP-based, RCA approach over activity-based methods (ABM) include¹:

1. The RCA model automates gathering, and building the relationship, of actual financial and operational data into comprehensive, applied business model. The relationships between resources, cost drivers and cost objects are automatically updated in the course of work. In contrast, the ABC model

¹ Syed Ajaz Ahmed, Mehboob Moosa, Op. Cit., pp. 759-760.

relationships are often discerned through subjective interviews and other time-study snapshots.

2. RCA provides a forward-looking business model. This is in contrast to the activity-based system, which is generally recognition of current and future business changes.

3. RCA focuses on managing resource capacity as the basis for managing attributable costs, with costs driven by quantities of capacity demanded. ABC, using full absorption approach, drives all supplied cost through the business, regardless of the actual quantity of resource demanded by service receiver.

4. RCA recognizes resource interdependencies between the cost centers themselves and retains the transparency of the individual cost elements that make up the cost center pool. ABC models are of a step-down nature, (from resource to activity to cost object) without recognizing fully burdened resource costs.

2.2.4 The Features of Resource Consumption Accounting

The features of RCA are summarized as presented below. They are to¹:

- Model how the resources are used by outputs,
- Categorize the costs in the cost centers into two as fixed and variable,
- Use flexible budgeting in the level of the cost center,
- Charge the responsibility of the costs on the managers of the cost center,
- Provide high-quality cost data in the short-term decisions,
- Clearly show the causative relations between operating resources,
- Enable the cost management data related to the final product or services,
- Provide directly understanding the capacity costs and resource capacity management,
- Enable the management of complicated cost models.

In addition to provide high-quality cost data in the short-term decisions RCA can also allocate fixed costs on an activity basis to support long-term decision making. It's a tool helps in short and long-term decision.

2.2.5 FUNDAMENTAL PRINCIPLES OF RCA

The principles needed for managers to have a model that allows them to make correct decisions are causality, responsiveness, and work².

1/ Causality:

¹ Ercument OKUTMUS, Op. Cit. p 48.

² Larry White, Op. Cit., p 67.

This is the most important concept because it provides rationality, logic, and responsibility to the model. This principle demands that resource flows and their associated costs be modeled to reflect cause-and effect relationships. This means eliminating arbitrary allocations between resource pools. If a causal relationship cannot be established, a resource flow and its costs must be allocated to a higher level in the organization. The most typical example is excess capacity. If a work center has excess capacity, it should not be allocated to the product or service outputs of that work center. It should generally be allocated to a point in the organization where the responsibility for the excess capacity rests. For example, if sales are down, marketing or general management of that product line bears the responsibility for the excess capacity. It should never be reflected in higher product cost. Causality demands resource flows and their costs be modeled from resources to consumers (support and direct) through the value chain on a strict cause and-effect basis. If a resource pool does not require output from another resource pool, it will not incur any costs from that resource pool. This means final products and services will not reflect full cost as defined by generally accepted accounting principles. Full cost requires non causal allocations of costs to the unit level of a product or service. The relevant term for a purely causal-based cost of a final unit of product or service is the attributable cost. The term was established in 1963 by Professor Gordon Shillinglaw as the closest you can get to full cost and still maintain cause-and-effect integrity. Attributable cost is the correct cost for management accounting focused on the objective of improving management decision making throughout the organization¹.

This principle is also one of the principles of ABC system as mentioned in study of Anton Van Der²;

Staubus viewed causality as crucial in assigning activity inputs and outputs. He suggested that non-causal costs (e.g., idle capacity costs) be excluded from activities altogether. Note Staubus' point here: the allocation of the cost of inactivity to an activity is paradoxical and anything but an appropriate approach to activity-based costing. He also recognized that causality is quantity-based, i.e., causal relationship modeling in costing should occur between operational input and output quantities. Staubus, therefore,

¹ Ibid, p67.

² Anton Van Der Merwe, Debating The Principles: ABC and its Dominant Principle of Work, Cost Management [formerly Journal of Cost Management], September/October 2009, p 2.

proposed the use of input and output quantities in activity modeling and their valuation with standard rates.

As shows above, the same principle but in different view in RCA system focuses on the resources and ABC system focuses on the activity.

2/ Responsiveness:

The principle of responsiveness is introduced to ensure compliance with the principle of causality in modeling in resource consumption and cost behavior. Responsiveness governs the fixed and proportional relationships between resource pools. It also allows for the unique characteristics of these more detailed relationships that significantly enhances effective decision support—for example, the fact that the nature of costs changes as inputs are consumed by resource pools throughout the organization, such as with electricity. Electricity comes into the organization as a resource procured completely proportionally, but as soon as it is consumed to heat or light a building it becomes a fixed cost. Some production equipment also requires a continuous flow of electricity when not in use¹.

The principle traditionally used in consumption in cost modeling, which we call the principle of variability, assumes a relationship between total cost and total volume. That is too high a level for accurate causal representation. With the principle of responsiveness, the integrity of an individual resource pool's resource/cost flows through the value chain is visible and maintained. The resultant information allows managers to make optimization decisions throughout the organization and to align support and direct production resource pools in meeting organizational objectives. A model based on the principle of responsiveness also supports detailed planning, simulation, and forecasting since costs throughout the organization are responsive to changes in outputs that result from decisions².

This principle provide managers with particular views into resources as they relate to changes in product output and provide information reflects organizationally fixed and proportional resource costs. Beside, this principle is contrary to the principle of ABC system (variability) which was considered a problem.

Johnson and Kaplan correctly identified the principle of variability as problematic. They nevertheless incorporated variability into their view of

¹ Larry White, Op. Cit., p 67.

² Ibid, p68.

cost behavior for ABC but suggested adding time (the long term) to determine whether a product cost is “fixed” or “variable.” Their “all is variable” view quickly became accepted ABC practice¹.

3/ Work:

The principle of work is not a universal principle like causality and responsiveness but is necessary, because sometimes tracing resource flows between cost objects does not yield sufficient information for managerial decisions. It is necessary, in some cases periodically and in some cases continuously, to know what activity is executed in the resource consumption between resource pools. The principle of work was the guiding principle of activity-based costing, which always modeled activities and often produced highly complex models that were unsupportable in the long term. Resource consumption accounting applies the principle of work or activity modeling in a much more limited and highly disciplined manner. Activities are only included in a model when they add critical, ongoing information that managers need frequently. Activities must have quantity-based drivers that provide capacity information, not allocations or percentages, and they also consume inputs in a quantitative manner².

The principle work is as well a principle of ABC system also criticized because this system adopts the work principle focusing on activities while the RCA system adopts the work principle focusing on resources.

The work principle, for all its persuasive simplicity, had one drawback: it is so poorly defined that it ended up undermining the two other (already compromised) principles. Causality was further eroded by the work principle justifying activity-to-activity allocations, and cost behavior insights were weakened by implying a link between activities and cost causation. This latter view added to the confusion around variability and avoidability and exacerbated errors in decision-making when using ABC information. For example, since all the costs on an activity/business process were considered “variable,” the reasoning was that these costs would no longer be incurred when the activity/process is outsourced. In practice this turned out not to be the case because cost avoidability is a function of reducing the resources and not merely their work³.

2.2.6 The Pillars of RCA:

¹ Anton Van Der Merwe, Op. Cit., p 3.

² Larry White, Op. Cit., p70.

³ Anton Van Der Merwe, Op. Cit., p 3.

Fundamental pillars of RCA¹;

1/ Focus on Resources and Their Consumption

2/ Quantity Structure for Resource Consumption

3/ Recognizing the Inherent and Changing Nature of Costs

1/ Focus on Resources and Their Consumption:

Resource principles of this approach include the following²:

- Identification of various interactions between resources
- Trying to include all attributable costs when allocating costs
- Providing a framework for capacity management

The concerned base of RCA is the resource. Though RCA still adopts the accounting idea of “resource-activity-product”, but its emphasis is transferred to the “resource”, not the “activity” in ABC. The resource defined by RCA is generalized, and it includes various objectives such as worker salary, raw material and fixed assets depreciation consumed by the activity. The resource includes not only the resource consumed by the activity but also the resource consumed by the resource itself. According to causality of “activity consumes resource, and product consumes activity”, RAC takes the consumption of resource as the focus to calculate the costs, i.e. RCA distributes the costs to the cost objectives according to the resources, and solves the problems of cost distribution and cost management happened in the transfer of product values from one department to another department³.

RCA focuses on operational costs and resource consumption, and chosen cost centers reflect this. The RCA model uses many more cost centers than traditional accounting methods. Each cost center’s resources must be homogenous and must be the responsibility of only one manager. By grouping resources around a simplified output measure, cost centers are simpler to manage⁴.

2/ Quantity Structure for Resource Consumption:

Structural principles of quantities focus on these two points⁵:

- Consistency of cost flow from the sender to the recipient based on quantitative relationships
- Cost breakdown from defined relationships of resource consumption.

¹ Larry White, Op. Cit., p73.

² Mahmoud Rahimi, et al., Op. Cit., p 535.

³ Yanhui Wang, et al., Op. Cit., p 84.

⁴ Shirley A. Polejewski, Op. Cit., p 3.

⁵ Mahmoud Rahimi, et al., Op. Cit. p 535.

Normal Costing's method of explaining relationships are based on dollar values, but expressing this relationship on a dollar basis causes fixed cost distortions. By using quantitative relationships based on causality, RCA produces more accurate results as a predictive model¹.

3/ Recognizing the Inherent and Changing Nature of Costs:

RCA principles of recognition of the essence and nature of the potential variability of costs focus on these two aspects²:

- Determining the inherent nature of a cost item, when imposing, according to managerial decision or planning future resource consumption
- Changes in costs and identification of cost items that initially were variable but may be used in a fixed way, and considering consumption patterns of cost items

RCA separates costs according to their behaviors, while Normal Costing assumes all costs are variable. RCA separates the costs into both Variable and Fixed Classifications and provides two hourly rates for managers. This distinction allows us to better see how volume changes affect our costs. Separating the fixed costs from the variable costs also allows us to highlight idle capacity. This is one of the major strengths of RCA. In order for managers to manage their idle capacity, they must be able to quantify it. RCA explicitly defines the idle capacity and gives this information to managers to utilize unused resources and make better decisions³.

These three main principles of RCA are important in understanding how this cost management system works. There are other RCA differences that make this method unique as well. Calculate asset costs in RCA by using Theoretical Capacity instead of planned usage. This helps to highlight the costs of machines when they are not at full capacity. Normal Costing usually applies these assets' costs over the planned usage. This strategy hides unused capacity instead of highlighting it by having the productive costs inconspicuously absorb the non-productive costs. Resource Consumption Accounting applies these concepts to provide better information to managers to make decisions⁴.

The use of theoretical capacity provides the managers that the idle capacity is seen in the frame of theoretical capacity that is not consumed. It is

¹ Shirley A. Polejewski, Op. Cit. p 5.

² Mahmoud Rahimi, et al., Op. Cit. p 536.

³ Shirley A. Polejewski, Op. Cit. p 6.

⁴ Ibid, p 7.

required that the cost assigned in the resource pools are categorized as stable and variable in order to determine the idle capacity. The resource pool means various resource elements, and defines the production capacity of a management. The costs are distributed to the cost objects in the system when the resources are in fact consumed, but the whole resource costs related with idle capacity which is not distributed to the cost objects are remained in the resource pools. Another difference is using the replacement cost in RCA instead of historical cost in the amortization calculation provides more updated production cost, and enables the management to set up a balance in the decisions of using resources decreasing the decision of keep using the machines. Moreover, the mistakes resulted from the deviation in the costs disappear¹.

In order to find a solution to a particular problem, it is necessary to know the main cause of this problem, while this system seeks to reduce costs, it must be known what causes the cost;

2.2.7 WHAT CAUSES COSTS?

Costs are important to model since they are much more certain than revenues and typically must precede revenues. This leads to a fundamental and very basic question—what causes costs? However, in recent years, various management accounting techniques have provided different answers -ABC focused on activities, TOC focused on constraints or chokepoints, and lean accounting focused on the production value stream. The correct answer has often been recognized, but it hasn't been made the focus of any method or approach. Resources are the cause of all costs (and, of course, all revenues). As soon as resources are applied to an endeavor, costs are incurred—people, buildings, equipment, and the like. You can stop an activity and you will save no costs unless you eliminate or significantly redeploy the resources engaged in the activity; anything else simply shifts the cost of the resources elsewhere in the organization².

Since it is the resources that create the cost, it is necessary to identify the nature of the resources below;

2.2.8 The Nature of Resources:

Resources are economic elements that enable one to perform activities. Common resources of a manufacturing plant include direct materials, direct labor, electricity, equipment, and so on. When a company spends money on

¹ Ercument OKUTMUS, Op. Cit., p 49.

² Larry White, Op. Cit., p 65.

resources, it is acquiring the ability or capacity to perform an activity. An activity is a task, such as setting up equipment, purchasing materials, assembling materials, and packing completed units in boxes. When a firm acquires the resources needed to perform an activity, it obtains activity capacity. Usually, the amount of activity capacity needed corresponds to the level where the activity is performed efficiently. This efficient level of activity performance is called practical capacity. If all of the activity capacity acquired is not used, then there is unused capacity, which is the difference between the acquired capacity and the actual amount of the activity used. The relationship between resources use spending and resource usage can be used to define variable and fixed cost behavior¹.

Resources main characteristics are:

- 1) Ability or capability
- 2) Capacity
- 3) Cost structure or behavior

1. **Capability:** Capabilities are the qualitative features of the resource. Questions like these represent features of resources: How well trained are workforces? How well do they perform? What is the quality the machine is able to deliver? How versatile is the machine? These features are very important, but normally are not a direct factor of a model, though they may be a criterion for decision-making².

2. Capacity:

The Institute of Management Accountants Statement of Management Accounting identifies 12 different capacity models. Resource consumption accounting uses the Consortium for Advanced Manufacturing-International (CAM-I) model which focuses on theoretical capacity of resources. Human resources are available based on the hours in their employment agreement. Physical resources, if owned or leased without restrictions, are available. Capacity is broken down into three categories³:

a. **Productive:** The resource is producing or providing the services it was designed to accomplish.

b. **Nonproductive:** The resource is engaged in maintenance, set-up, planned standby, waste (poor-quality production), training, and necessary

¹ Don R. Hansen, Maryanne M. Mowen, Cornerstones of Cost Accounting, South-Western Learning, Canada, 2011, pp. 75-76.

² Mahmoud Rahimi, et al., Op. Cit. p 536.

³ Larry White, Op. Cit., p 65.

administrative activities (other than their primary work); broken down or ill; on paid vacation, and the like.

c. **Idle:** The resource is not employed in its primary activity because there is simply no work to do due to lack of demand or designed in excess capacity beyond current demand. This category also includes time that management decides or law/contractual agreements require that no work be done. For example, an office space is normally idle for 12–16 hours a day if only one shift works in each office or desk.

Focuses on theoretical capacity of resources and showed idle capacity this makes RCA system distinct from other systems.

3. Cost Structure and Cost Behavior

Cost behavior is the study of the ways in which costs vary or do not vary with the level of activity in an organization. The level of activity was described as the amount of work done or the number of events that have occurred. On the other hand, also defines cost as expenses, which have been consumed in earning revenue. Profitability was however defined as the excess of revenue and cost. In other words, profit is determined by deducting the cost from revenue. This shows the linearity of profit and cost. The term “variable” and fixed cost otherwise known as indirect and direct expenses have been traditionally used in the management accounting literature to describe how costs react to changes in activity level. Short-term variable costs vary in direct proportion to the volume of activity that is, doubling the level of activity double the total variable costs. This was assumed by Fischer and Schmitz to lead to an increase in profit. Consequently, total variable costs are linear and the unit variable cost is constant¹.

Resource costs are reflective of resource characteristics. Human resources have a pay rate, benefits, and vacation allowance. Machines require maintenance, operators, energy, floor space, and the like. Each resource pool or work unit combines the characteristics of their resources and produces a fairly homogeneous output that transfers those costs to other resource pools or final outputs for a customer. Costs are fundamentally tied to the flow of resources and outputs of resource pools through the organization. If the operational resource flows are accurately modeled, the costs can be accurately modeled².

¹ Oyerogba Ezekiel Oluwagbemiga, Olaleye Michael Olugbenga, Solomon Adeoluwa Zaccheaus, Cost Management Practices and Firm’s Performance of Manufacturing Organizations, *International Journal of Economics and Finance*; Vol. 6, No. 6; 2014, p 235.

² Larry White, *Op. Cit.*, p 66.

2.2.9 Identification of idle capacity in RCA:

Capacity is one of the most important measures of resources used in production. Its definition and analysis is, therefore, one of the key areas of production management. The use of conventional parameters often leads to wrong decisions. There are three aspects of the problem of conventional capacity measures: the absence of economic content, quantity-based approach, and the unduly high emphasis lay on technical processes. If capacity measures could sidestep the problems discussed above, i.e. if they could include the value of resources, and could refer to the costs of unused capacity, then better decisions could be made in a number of cases. Changes in the nature of production, and the enhanced significance of auxiliary processes made calculations necessary for production and service systems where processes are difficult to quantify¹.

In traditional costing and the ABC models resource costs are prorated based on the assumption that all resources are fully allocated to operational activities of the organization. So the resource costs are fully allocated to the resource pools and no idle capacity will be identified. This assumption may be valid for raw materials but is not valid for Intangible assets such as IT services. RCA emphasize that costs and resource are not fully allocated and idle capacity may exist. Therefore costs item due to idle capacity should not be prorated on products but must be separately identified. If the resources are truly consumed for products, resources will be prorated on products, otherwise idle capacity costs should be identified as period costs².

Reverting back to the literature of the first half of the 20th century, Jordan and Harris, according to Vollmers, devoted an entire chapter of their cost accounting textbook to the issues of idle machine capacity. They expressed the opinion that due to managers not getting timely information regarding problems of idle machinery, they failed to get the utmost use out of their machinery. According to Vollmers, Fiske believed that poor business decisions were made when management were unaware of the various causes of idle capacity losses, losses which were usually depicted as an aggregated amount. He therefore classified idle capacity into three³:

- Productive idle capacity: possible idleness causes included breakdowns and power-failures.

¹ Zoltan Sebestyen, Viktor JUHÁSZ, The impact of the cost of unused capacity on production planning of flexible manufacturing systems, PERIODICA POLYTECHNICA, 2003, VOL. 11, NO. 2, p 185.

² Mahmoud Rahimi, et al., Op. Cit, p 536.

³ Ken Bates, John Bradshaw, Costing Systems and The Spare Capacity Conundrum: Avoiding The Death Spiral, Working Paper No. 85, Victoria University of Wellington, Wellington, NEW ZEALAND, 2011, p7.

- Administrative idle capacity: possible idleness causes included building a larger factory than required and retaining highly skilled staff when they are not required so as not to lose them to competitors.
- Economic idle capacity: possible idleness causes included seasonal businesses, cyclical business cycles and broad changes in demand that created conditions of over- or under-capacity.

2.2.9.1 Accounting For Excess And Idle Capacity:

Once fixed cost is recognized as a fait accompli, properly accounting for excess or idle capacity becomes paramount. The following three criteria are therefore proposed¹:

- a. The method should supply information that highlights the problem (e.g., idle resources).
- b. The method should supply information that gives unambiguous insight into the causes and effects of the excess and idle capacity—the downstream effects of the problem should be transparent. Excess and idle capacity costs should be allocated where they are visible and actionable.
- c. The method should supply information that is readily accessible and of sufficient quality and granularity to support the decision making process. Where is the excess capacity? What is the magnitude in dollars and as a percentage of total capacity? Is it temporary? Can resources be retrained or realigned? Is there an option to divest? If yes, what fixed cost will remain? Can excess capacity be marketed? If yes, then for pricing purposes, what is the proportional cost of producing one additional unit of resource output? Information that satisfies these preceding criteria will enable management to understand the reasons for excess capacity and idle capacity and to take corrective action.

2.2.9.2 Managing unused capacity

One of the major limitations of companies is unused capacity, which can be defined as the difference between available resources and consumed resources. In other words, unused capacity is the amount of capacity that is not employed in the primary activity of the business. It is also important to note that unused capacity could be found, as stated by Cooper and Kaplan, by subtracting the ‘activity usage’ from the ‘activity availability’. Therefore, it provides the relationship between the costs of resources used and the costs of resources supplied².

¹ David E. Keys, Anton van der Merwe, Op. Cit. p6.

² Veyis Naci Tanış, Hasan Özyapıcı, The Measurement and Management of Unused Capacity in a Time Driven Activity Based Costing System, JAMAR, Vol. 10, No. 2, 2012, p 45.

What action can management take when it identifies unused capacity? In general, it has two alternatives; they can attempt to eliminate the unused capacity, or it can attempt to grow output to utilize the unused capacity. In recent years many companies have downsized in an attempt to eliminate their unused capacity. Downsized also called rightsizing is an integrated approach of configuring processes, products, and people to match costs to the activities that need to be performed to operate effectively and efficiently in the present and the future¹.

Based on the foregoing, it's very important to clarify and provides information on idle energy, its causes and type, whether it is caused by natural causes or not, which enables the administration to behave properly regarding them and see if they should be disposed of or get the benefit of it.

2.2.10 The Functioning Of Resource Consumption Accounting

When the data enters the system in RCA, amount and total are combined; the accounting When the information entered the system, it is combined as amount and total price, then accounting system categorizes this data gradually as amount and total price. So, RCA focuses on a model which amount and total price are not separated from resource documents. RCA system has three basic stages which are the analyses of resources, the qualifications of the costs, and the method based on amount².

The definition of resource in RCA includes not only the resources consumed by activities but also the ones which are consumed by them. RCA takes into account the resource consumption in the cost calculation. On the other hand, it distributes the costs to cost objects according to the resources. It is very important to determine the relations between the resources in the system and the cost objects which consume the resources. In the cost distribution of RCA system the amount is used instead of percentage or total price, all processes are based on scales, and resource and activity consumptions are made according to the measurable standards. So, the causality between resource consumption and cost distribution is determined according to amount. In this sense, it is necessary that the activities be stated as amount that provides capacity data and costs are consumed as amount³.

The results shown below are expected from RCA⁴:

¹ Charles T. Horngren, et al., Op. Cit., p 510.

² Ercument OKUTMUS, Op. Cit. p 48.

³ Ibid., p 49.

⁴ Ibid., p 50.

- To define the causative relationship between the expenses in the auxiliary expense environments differently from the other systems and consumption objects,
- To determine the expenses relation which is originally variable, but shown as the fixed expense in the other systems,
- Amortization calculation and the usage of theoretical capacity via the replacement cost come to an end forming crisscrossing effects. (The usage of the replacement cost increases the unit cost while the labor volume calculated according to the theoretical capacity decreases etc.).
- The distribution of the resources used only in the cost centers with expense distribution made according to the theoretical capacity.
- Fair value in distribution cost occurs because the costs which appear due to idle capacity are not distributed to the product or services.
- To provide the manager the opportunity of categorization and monitoring the costs in each level different from other systems.
- The costs of product and services are only consisting of resource cost consumed.

The researcher can summarize the above as follows;

RCA monitors closely the amount of the consumed resources and structure of these resources and costs. Besides, it shows the idle capacity instead of historical costs uses the replacement costs and utilizes observe the cost data in various levels. The resources in the RCA system are reasons for all costs. Which explain that even if an activity is halted, it doesn't reduce as much as the resource assigned to this activity is removed.

Different Approaches to RCA

There are three ways to use RCA¹:

- 1- It can be applied as a complete system,
- 2- It can be implemented incrementally, and
- 3- It can be used subjectively without changing the current system.

2.2.11 The Advantages and Disadvantages of RCA

2.2.11.1 The Advantages of Resource Consumption Accounting:

The benefit of RCA system is summarized as presented below²:

¹ Clinton, B. D., D. E. Keys. Not Dated. Resource consumption accounting: The next generation of cost management systems. Focus Magazine (5), p1.

² SALLY WEBBER, DOUGLAS CLINTON, Op. Cit., p12.

- Properly attributing costs to specific production processes and their outputs resulted in more accurate cost assignment and a better understanding of resource consumption patterns.
- The achievement of more accurate cost assignment provided the ability to conduct resource planning using only relevant costs.
- The use of replacement cost depreciation eliminated the issue of unequal cost assignment for similar products that consumed similar resources and support activities.
- Product costs included only the cost of resources used.
- The amount of excess/idle capacity was made visible to managers based on unconsumed theoretical capacity.
- Cost assignment based only on causality eliminated costs that were previously assigned based on unrelated changes to other products.
- The incentive to non-strategically lower selling prices to artificially manipulate cost allocation amounts to specific products was eliminated.
- Properly identifying resource consumption based on the innate nature of particular costs enhanced managers' ability to understand resource interrelationships and use the underlying information to support incremental decision making.

Larry added other advantages in addition to what was mentioned above¹;

- The complexity of the model can be readily managed— when process insights are needed, they can be added. When process insights are not needed, simpler direct resource pool-to-resource pool relationships can be traced and will still provide an effective measure for control and monitoring of process effectiveness.
- The information is readily available to produce multilevel (within the organization) and multidimensional (product or service, customer, distribution channel, etc.) contribution margin and profitability reporting.
- Another benefit is the aspect of planning and forecasting. Because the model is highly divisible in terms of resource flows and costs, the model can be easily run in reverse to assess the impact of new scenarios on the modeled current operations—what operational constraints may occur and various cost impacts. Once the operational plan is final, RCA lends itself to variance analysis comparing planned resource flows, costs, margins, and profits to actual results. These variances are meaningful to managers since the typical distortions associated with traditional standard costing allocations are eliminated, and costs relate directly to operational resource flows.

¹ Larry White, Op. Cit., p 76.

2.2.11.2 The Disadvantages of Resource Consumption Accounting

As with any new system, there are some drawbacks to RCA. RCA is expensive to implement. There is significant planning time required, and an integrated ERP system must be implemented as well. This will prove to be difficult because RCA is very new and very few software companies have implemented these methods. Also, RCA may not be a good fit for companies with non-routine activities. Causal relationships will be hard to define for non-routine activities¹.

Based on the above, the researcher believes that the emergence of this system as a result of technological developments and the complexity of the production systems. Therefore, the system that emerged to deal with this problem must also be complex and needs to be applied to the effort, cost and time. The researcher do not think that this is a problem as long as the information provided by this system performs the required purpose and that information is not provided by other systems with the same accuracy and quality. However, the need for evolution forces organizations to abandon traditional systems and use these modern systems despite their complexity and cost. Compared to the ABC & GPK systems, the RCA is best because it combines the advantages of both systems.

2.2.12 Comparing RCA Features With Other Costing Techniques:

At the end we compare RCA features with other common techniques and traditional management accounting approach²;

- In RCA the cost of idle capacity is in the area of responsibility of a person or a particular level and is not assigned to products. But in other techniques because of lack of capacity identification, this cost is not assigned to a specific person or level and is divided between products.
- The capacity analysis in this method is easier than other methods, and due to the visibility of idle capacity in RCA, there is the possibility of accounting for unused capacity.
- Fixed and variable cost identification and assigning in this approach is possible in each level that specifies the exact nature of each cost. In traditional approaches, cost identification is based on whether a special cost is fixed to the final product or variable. This makes a correct pattern of cost item ambiguous.

¹ Shirley A. Polejewski, Op. Cit. p 8.

² Mahmoud Rahimi, et al., Op. Cit. p 538.

- RCA stated that the nature of cost items may change in various resource levels. In other approaches, the pattern of cost items is not investigated in resource level.
- Tracking of cost in a particular unit or level of a product does not exist in other methods but in RCA tracking of resource level as well as the whole level of organization is possible.
- In this approach, actual financial information is available in countable quantitative form but in other management accounting approaches this information is not available most of the time and assigning of the cost items is based on a percentage which doesn't represent the actual flow of resource consumption.

Comparing with traditional cost accounting method, the advantages of RCA are mainly embodied in this aspect. RCA could provide information on different layers such as cost information, marginal cost information, surplus unused ability and department resource use rate for the decision-makings such as cost management or higher layer policies¹.

The most important difference between RCA and ABC is that while the activities are seen as the resource of costs in ABC, the costs are reasons of the resources in RCA. Moreover, in RCA the resource costs are categorized as fixed and variable according to cost behaviors. Accounted idle capacity costs are not distributed to the products and services, and they do not obtain shares from resources which they do not utilize. ABC distributes the resource costs into activities and the products and services as cost object; RCA does not distribute the resource costs directly to the activities; assigns them in resource pools, and distributes them to the activities. The distribution of the costs to the products and services are assigned in the activity pools. The second stage in ABC, the distribution from activity pools to cost objects, is comparatively easy, the first stage, the distribution of the resources to the activities is a hard process because of the resource variety. However, RCA makes the distribution of resources to the activities ease assigning the ones belonging to the different departments of a management in a more limited amount².

RCA's biggest differentiator that sets it apart from other management accounting approaches that have their roots in the US is that it is a principle-based approach to MA. 8 Other US approaches are method centric, i.e., they each promulgate a particular method to parsing the general ledger (G/L).

¹ Yanhui Wang, et al, Op. Cit. p 85.

² Ercument OKUTMUS, Op. Cit. p 47.

RCA is not prescriptive as to the obligatory use of certain methods, only of the principles that underlie good decision support information (e.g., causality as the basis for cost associated with an output). This means that RCA does not force every single dollar through a resource pool (GPK), an activity (ABC), or a value stream (TOC), i.e., a method centric approach. Instead, RCA approaches cost modeling from the manager's enterprise optimization needs. The clearest example of this is in RCA's conditional application of the process/activity view. Another example is the flexibility RCA allows in defining traditional GPK resource pools. For example, in lean environments where a single resource pool can be defined for an entire value stream if that meets optimization needs. Lean thinking and its emphasis on a systems view are changing the way manufacturers—and increasingly service entities—look at their value chain and the information they need to manage it. Lean in its ideal application elevates optimization to the mega-machine level negating the need in many cases for the detailed individual resource insight GPK was founded on. This also means that the ex-post control of functions—a traditional GPK strength—within the optimized value chain no longer adds value¹.

The discussion as to GPK's weaknesses also sets the scene for highlighting how RCA is different in specific aspects. In regards to the application of scope, GPK and RCA both utilize the principle of causality and quantitative modeling. RCA's application to indirect cost areas and inbound logistics of raw materials has more to do with the era of inception of each approach and the materiality of these indirect areas at that time².

It is on the decision support front however that RCA clearly distinguishes itself from other management accounting approaches. In this regard, two aspects of RCA are relevant in addressing GPK's weaknesses³;

The first is RCA's ability to provide throughput margins that include all avoidable cash outflows for a throughput decision whether product -related direct costs or secondary/support service costs.

The second relates to the assignments of common fixed costs. RCA incorporates a uniquely US concept to enhance the decision support information it provides namely, the principle of attributability. This principle governs the assignment of non-causal fixed costs (e.g., excess/idle capacity costs) to levels in RCA's multiple margin P&L where they are decision

¹ PETER VON ZIMMERMANN AND DAWN SEDGLEY, Op. Cit.,p5.

² Ibid., p 6.

³ Ibid., p6.

relevant. The principle of attributability and the resultant attributable cost solves the thorny issue in MA of treating fixed costs in a manner consistent with enterprise optimization objectives.

The differences between the RCA system and the other systems can be summarized in the table (2.2.1) below;

Table (2.2.1) The differences between the RCA system and other systems

	Traditional	ABC	GPK	RCA
The Idle capacity	Idle capacity is not visible and its assigned to products	Idle capacity is not visible and its assigned to products	Idle capacity is visible and it's not assigned to products	visibility of idle capacity and is not assigned to products
Main Focus	The information is distorted for long and short decision	focuses on long term decisions	focuses on short-term decisions	Long and short-term decision
Cost modeling	Non-quantity-based	Non-quantity-based	quantity-based	quantity-based
Cause of costs	Direct labor hours, quantity	Activities	Resources	Resources
reporting for profitability analysis	A single level contribution margin reporting	A single level contribution margin reporting	A multi-level, multi-dimensional contribution margin reporting	A multi-level, multi-dimensional contribution margin reporting
categorization of costs	Fixed and variable	Fixed and variable	proportional or fixed	proportional or fixed
The degree of complexity	simple	complex	complex	complex

Source: prepared By Researcher

The researcher presented in this section, the resource consumption accounting system, which combines the German cost management system Grenzplankostenrechnung (GPK) with the Activity-based costing (ABC) to form a comprehensive management accounting system that combines the advantages of the two systems, but it is complicated and expensive, which is considered compared to its benefits a simple problem. Moreover it was compared with the systems of ABC, GPK and traditional system.

Chapter Three

Total Quality

Although quality and total quality management they have the same goal, which is a high quality of products or services and satisfying customer expectations. However, quality revolves around the concept of meeting or exceeding customer expectation applied to the product and service which is a more limited approach. While TQM deals with the entire process of production, where all elements of a firm are connected to make a quality product, all aspects of a firm must be constantly striving for improvement. Everything from accounting to the work environment all has a part to play in creating quality goods and services. This chapter discussed total quality management, first reviews the concept of quality, then it reviews everything related to total quality, this will be done through two sections as follows:

Section One: Total Quality Management

Section Two: The Costs of Quality

Section One

Total Quality Management

3.1.0 Introduction

This section concerns Total Quality Management, reviewing background of quality, quality assurance & quality control, quality management, the essentials of Total Quality, Obstacles to Implementing TQM and criticisms.

3.1.1 Background of Quality

In recent years, Total Quality Management (TQM) has received worldwide attention and is being adopted in many industries, particularly in developed economies. TQM has evolved primarily because of the changes in the global economy and also because of demand in market forces. Although control of quality has been practiced in many industries for several years, the adoption of TQM as a major preoccupation of businesses worldwide is very recent. The traditional control methods being implemented in industries to ensure quality have not yielded the results that were expected of them. Furthermore, rapidly changing technology and customer expectations have already affected organizations worldwide and thus have promoted the need for taking a new look at quality management¹.

Recently, US manufacturers have shifted their focus from evaluating short-term measures to measures based on quality. Total Quality Management (TQM) movement was led by the Japanese electronics and auto goods manufacturers. This change in focus was due to the fact that the companies focusing on quality were more profitable in the long run. Baldrige Award recognizes the achievement of excellence in Quality².

Prior to the increased level of Japanese competition in the U.S Marketplace in the 1970s and 1980s, quality was not uppermost in the minds of U.S. business organizations. They tended to focus more on cost and productivity than on quality. It wasn't that quality was unimportant, it just wasn't very important³.

¹ R.R. Lakhe, R.P. Mohanty, Total Quality Management Concepts, Evolution and Acceptability in Developing Economies, International Journal of Quality & Reliability Management, India, Vol. 11 No. 9, 1994, p 9.

² Deepak Subedi, Suneel Maheshwari, IMPACT OF TOTAL QUALITY MANAGEMENT (TQM) ON PROFITABILITY AND EFFICIENCY OF BALDRIDGE AWARD WINNERS, Delhi Business Review X Vol. 8, No. 1, 2007, p55.

³ William J. Stevenson, Operations Management, theMc Graw-Hill Companies Inc., New York, 2009, tenth edition, P 405.

Partly because of that thinking, foreign companies, many of them Japanese, captured a significant share of the U.S. market .In the automotive sector, leading Japanese manufacturers Honda, Nissan and Toyota became major players in the auto sales market in the United States. Both Honda and Toyota built a reputation for quality and reliability in their cars. Many U.S. companies changed their views about quality after that, and changed them drastically, stung by the success of foreign competitors, they embraced quality in a big way. They hired consultants, sent their people (including top executives) to seminars, and initiated a vast array of quality improvement programs. Those companies clearly recognized the importance of quality and realized that quality isn't something that is tacked on as special feature but is instead an integral part of a product or service. Moreover, managing for quality is now a key element of competition¹.

Before identifying concepts and what related to the management of total quality, it is necessary to review the concept of quality first;

Quality represents an important scale for organization's success, survival and continuity. Although there is a clear contrast on the opinions of the specialists and scholars about the characteristics that distinct high quality organization and their studies there is wide agreement on the importance of the role it plays in the success of these organizations and it's distinction form traditional organizations².

Quality is an emerging concept. In the past, quality meant " conformance to valid customer requirements" that is, as long as an output fell within acceptable limits, called specification limits, around a desired value, called the nominal value or target value, it was deemed conforming, good, or acceptable³.

Following this definition, many definitions of the term quality appeared by different pioneers of quality and some of those pioneers defined quality as follows;

Some of the popular definitions for quality are⁴:

¹ Ibid., P 407.

² Latif Atiyah, Product's Quality and Its Impact on Customer Satisfaction A Field Study in Diwanayah Dairy Factory, Proceedings of The 10th International Management Conference "Challenges of Modern Management", University of Craiova, Romania, 2016., p 64.

³ Howard S. Gitlow, et al., Quality Management, New York , Third Edition, 2005, PP. 17-18.

⁴ S.R AJARAM, M.SIVAKUMAR, Total Quality Management, Himel Impressions, New Delhi, 2009, PP. 4-5.

- "Quality is a predictable degree of uniformity, at low cost and suited to the markets." W. Edwards Deming
- " Quality is fitness for use." Joseph M. Juran
- " Quality is conformance to requirement" Phillip. B. Crosby
- "Quality is the minimum loss imparted by a product to society from the time the product is shipped". Genichi Taguchi
- "Quality is a company- wide issue and must be an all-pervasive influence on the way every issue of business is conducted." Kaoru Ishikawa

The researcher believes that the broader definition is Phillip. B. Crosby definition because the phrase “conformance to requirement” Covering all aspects, whether quality or cost or others requirement.

Broadly defined, quality refers to the ability of a product or service to consistently meet or exceed customer requirements or expectation. Different customers will have Different requirements, so a working definition of quality is customer-dependent¹.

The researcher believes definition of quality differed based on the aspect seen by the writer. For example, Edwards Deming he defined the quality from the management point of view, his definition links quality with low cost and what suits the market, and that depending on the management's ability to reduce costs and how much they know what the market needs, Kaoru Ishikawa also defined the quality from the management point of view and the internal perspective of the company. While Joseph M. Juran and Phillip. B. Crosby define quality from the customer's point of view, quality depends on whether the customer finds this product suitable for use or conform to what he expects. While Genichi Taguchi focused his definition on the community and on the loss which we can suggest that he focused on the company and client side.

3.1.1.1 Types of Quality

Three type of quality are critical to the production of products and services with a predictable degree of uniformity and dependability, at low cost, which are suited to the market. They are²; (1) quality of design or redesign, (2) quality of conformance, and (3) quality of performance.

¹ William J. Stevenson, Op. Cit., P 405.

² Howard S. Gitlow, et al., Op. Cit., p 21.

Quality of design is determined before a produced. Quality of design is determined by market research, the design concept, and specifications. Market research, the ordinarily is aimed at assessing customer needs. Since there different ways to meet those need, a particular design concept must be developed¹.

Quality of conformance is the extent to which a firm and its suppliers can produce products with a predictable degree of uniformity and dependability, at accost that is in keeping with the quality characteristics determined in a quality of design study. Once the nominal value and specification limits are determined via a quality of design study, the organization must continuously strive to surpass those specifications. The ultimate goal of process improvement and innovation efforts is to create products and services whose quality is so high that consumer (both external and internal) extol them².

Quality of performance studies focus on determining how the characteristics identified in quality of design studies, and improved and innovated in quality of conformance studies, are performing in the marketplace, the major tools of quality of performance studies are consumer research and maintenance, reliability, and logistical support and to determine why consumer do not purchase the company's products³.

3.1.1.2 The Dimensions of Quality

Customer expectations can be broken down into a number of categories, or dimension that customer use to judge the quality of a product or service. Understanding these helps organization in their efforts to meet or exceed customer expectation. The dimension used for goods are somewhat different from those used for services⁴.

(1) Product Quality: product quality is often judged on eight dimensions of quality⁵;

- Performance: main characteristic of product of service.
- Aesthetics: appearance, feel, smell, taste.
- Special features: extra characteristics.

¹ Roger G. Schroeder, Susan Meyer Goldstein, M. Johnny Rungtusanatha, operations Management – contemporary concepts and casasa, McGraw-Hill-Irwin, Fifth Edition, P 160.

² Howard S. Gitlow, et al., Op. Cit., p 23.

³ Ibid., P 22.

⁴ William J. Stevenson , Op. Cit., p 412.

⁵ Ibid., pp. 412-413.

- Conformance: how well a product or service corresponds to design specifications.
- Reliability: consistency of performance.
- Durability: the useful life of product or service.
- Perceived quality: indirect evaluation of quality (e.g. Reputation).
- Serviceability: handling of complaints or repairs.
- * Notice that price is not a dimension of quality.

(2) Service quality: The domination of product quality don't adequately describe service quality, instead, service quality is often describe using the following dimensions¹;

- Convenience: the availability and accessibility of the Service.
- Reliability: the ability of perform a service dependably, consistently, and accurately.
- Responsiveness: the willingness of service providers to help costumer in unusual situation and to deal with problems.
- Time: the speed with which service is delivered.
- Assurance: the knowledge exhibited by personnel who come into contact with a customer and their ability to convey trust and confidence.
- Courtesy- the way costumers are treated by employees who come into contact with them.
- Tangibles – the physical appearance of facilities, equipment, personal, and communication materials.
- Consistency - the ability to provide the same level of good quality repeatedly.

Based on the above, the quality depends on the previous eight dimensions and that the product or service if it satisfies the basic needs of the client, this is not enough, but must be provided by the eight dimensions to ensure the customer's satisfaction and loyalty.

3.1.2 Benefits of Good Quality:

Business organizations with good or excellent quality typically benefit in variety of ways: an enhanced reputation for quality, the ability to command premium prices, an increased market share, greater customer loyalty, lower liability costs, and fewer production or services problems –which yields

¹ Ibid., P 413.

higher productivity, fewer complaints from customer, lower production costs, and higher profit¹.

In sum stressing productivity only may mean sacrificing quality and possibly decreasing output. Employees morale plunges, cost rise, customer are unhappy, and stock holder become concerned. On the other hand, stressing quality can produce all the desired results less rework, greater productivity, lower unit cost, price flexibility, improved competitive position, increase demand, larger profits, more jobs and more secure jobs. Customers get high quality at a low price, vendors get predictable long term sources of business and investors get profit. Everybody wins!²

3.1.3 The Consequences of Poor Quality:

It is important for management to recognize the different ways in which the quality of a firm's products or services can affect the organization and to take these into account in developing and maintaining a quality assurance program. Some of the major areas affected by quality are³:

1. Loss of business. 2. Liability. 3. Productivity. 4. Costs.

Poor design or defective products or services can result in loss of business. Failure to devote adequate attention to quality can damage a profit-oriented organization's reputation and lead to a decrease share of market, or it can lead to increased criticism and/or controls for a government agency or nonprofit organization.

In the retail sector, managers might not fully aware of poor product or service quality because customers do not always report their dissatisfaction. Even so, dissatisfied customers do tend to voice their dissatisfaction to friends and relatives, which can have negative implication for customer perceptions and future business.

Organizations must pay special attention to potential liability due to damages or injuries resulting from either faulty design or poor workmanship. This applies to both products and services. Thus, a poorly designed steering arm on a car might cause the driver to lose control of the car, but so could improper assembly of the steering arm. However, the net result is the same⁴.

¹ William J. Stevenson, Op. Cit., p 418.

² Howard S. Gitlow, et al., Op. Cit., p 27.

³ William J. Stevenson, Op. Cit., p 418.

⁴ Ibid., p419.

Productivity and quality are often closely related. Poor quality can adversely affect productivity during the manufacturing process if parts are defective and have to be reworked or if an assembler has to try a number of parts before finding one that fits properly. Also poor quality in tools and equipment can lead to injuries and defective output, which must be reworked or scrapped, thereby reducing the amount of usable output for given amount of input . Similarly, poor services can mean having to redo the service and reduce the service.

Cost to remedy a problem is a major consideration in quality management. The earlier a problem is identified in the process, the cheaper the cost to fix it .the cost to fix a problem at the customer end has been estimated at about five times the cost to fix a problem at design or production stages¹.

The researcher believes that when institutions look at high quality as increases in costs, this is a short-term view because the revenues generated by this expenditure lead to the achievement of the objectives of the institution. Moreover, poor quality also increases costs because the costs of repairing defective production are additional costs to the enterprise. Therefore quality in the present era is not an option but it's a basic requirement.

3.1.4 Quality Assurance & Quality Control & Quality Management

Quality control and quality assurance have much in common. Each evaluates performance. Each compares performance to goals. Each acts on the difference. However they also differ from each other. Quality control has as its primary purpose to maintain control. Performance is evaluated during operations, and performance is compared to goals during operations. The resulting information is received and used by the operating forces. Quality assurance's main purpose is to verify that control is being maintained. Performance is evaluated after operations, and the resulting information is provided to both the operating forces and others who have a need to know. Others may include plant, functional, or senior management; corporate staffs; regulatory bodies; customers; and the general public².

3.1.4.1 Quality Assurance:

From the business point of view, eliminating non-conformance was the key to a better level of quality and assurance of quality. And then the concept of Quality Assurance (QA) was developed. The central idea is to identify the

¹ Ibid., p 419.

² Dr. Ahmed Badr Eldin, Modern Approaches To Quality Control, INTECH, Croatia, 2011, p 10.

root cause of non- conformity, take steps to eliminate the cause and thus remove recurrence of the nonconformity in future deliveries to the customer. QA is defined as “All those planned and systematic actions necessary to provide an adequate confidence that a product or service will satisfy the given requirements for quality”¹.

Quality Assurance (QA) activities include a planned system of review procedures conducted by personnel not directly involved in the inventory compilation/development process. Reviews, preferably by independent third parties, should be performed upon a finalized inventory following the implementation of QC procedures. Reviews verify that data quality objectives were met, ensure that the inventory represents the best possible estimates of emissions and sinks given the current state of scientific knowledge and data available, and support the effectiveness of the QC program².

3.1.4.2 Quality control

“Quality control” is a universal managerial process for conducting operations so as to provide stability—to prevent adverse change and to “maintain the status quo”. To maintain stability, the quality control process evaluates actual performance, compares actual performance to goals, and takes action on the difference³.

Quality control defined as “Operational techniques and activities that are used to fulfill requirements for quality”. Organizations realized that “Inspection” alone was a costly affair as all that was segregated was a waste and a cost to the organization, thus reducing profitability. The result was the idea of “control on operations,” as Quality control. This was not necessarily very different from Inspection but had a new look at inspection. Under a system of quality control, there was a need to find controls for an activity, in the form of procedures, intermediate stage inspections and recording of performance of a process for giving feedback. The methods of inspection got sophisticated with addition of tools like sample checks, lot size, etc. for inspections at identified stages. However, the intention and activity of preventing a non-conforming product reaching a customer depended solely

¹ The Institute of Cost Accountants of India, , Business Strategy & Strategic Cost Management, second edition, India, 2014, p 10.3.

² IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories, Quality Assurance and Quality Control, https://www.ipcc-nggip.iges.or.jp/public/gp/english/8_QA-QC.pdf, p 804.

³ Dr. Ahmed Badr Eldin, Op. Cit., p 8.

on the screening inspection at the final stage of production or service delivery¹.

The researcher summarizes the above in one point that Quality Assurance & Quality Control have the same aim which is to ensure quality existence, but QA makes sure that there is no defect and QC is looking for the defect and then corrects it. Therefore, it is complementary to each other. The beginning is with quality assurance because it is the basis on which the quality is planned and confirmed at the beginning of the project, and then comes quality control to ensure that the planning has been exactly implemented.

3.1.4.3 Quality Management

Quality management is defined as “coordinated activities to direct and control an organization with regard to quality”².

Quality management has had many different meanings over the years. In the early 1900s, quality meant inspection, which was the primary method used to ensure quality products. In the 1940s, quality took on a statistical connotation as statistical methods began to be used to control quality within the natural variation of the process. Statistics pioneer Walter Shewhart developed statistical control charts to maintain a process within a state of statistical control and thus reduce the amount of inspection required. In the 1960s, the meaning of the term quality management was expanded to include the entire organization as all functions helped in designing and producing quality. Quality was seen not as just an act of production rather, it was something the entire organization should strive to provide for the customer. Now, quality is taking on a broader meaning, including continuous improvement, competitive advantage, and a customer focus³.

The researcher summarizes that quality management is to ensure the availability of quality through quality planning, quality assurance, quality control and improvement and maintenance of quality, thus include both quality assurance and control.

There are five key steps involved in implementing a quality management system⁴:

¹ The Institute of Cost Accountants of India, Op. Cit, p 10.3.

² Ibid., p 10.3.

³ Roger G. Schroeder, Susan Meyer Goldstein, M. Johnny Rungtusanatha, Op. Cit., pp158-159.

⁴ S.R AJARAM, M.SIVAKUMAR, Op. Cit., PP. 282-283.

- 1- Analyses your business by breaking it down into key areas. These will tend to be those that are crucial to customer satisfaction. Senior staff should determine the needs of the business and design the system around these.
- 2- Plan your approach by deciding which resources you need and discussing the effectiveness of existing processes with staff.
- 3- Decide if new processes are necessary and tell staff about them – provide training if necessary.

Check that the processes are working by appointing someone to be responsible for the system and ensuring proper procedure are followed. Targets need to be set for how each process contributes to success of business goals.

5-Revise processes where necessary and continues to review them regularly.

It is essential that senior managers are committed to the implementation of a quality system. Without this support it will be very hard to convince employees of the benefits. It is also required to create a quality manual containing documentation on how processes should be followed. It should specify how the quality management system will be followed and emphasis the business' commitment to quality and continuous improvement. Having a quality management system in place can help us to introduce and maintain wider changes to our business. Unlike an ISO9000 initiative, which will usually be restricted to specified business processes, a Total Quality Management System (TQM) applies to the whole business; it aims to ensure complete customer satisfaction¹.

Due to the advantages and benefits of quality in the institutions, therefore quality has become not only for the product or service, but extended to include operations and all areas and activities of institutions, and that's what so called TQM.

3.1.5 TATAL QUALITY MANAGEEMENT (TQM)

Total Quality Management (TQM) is a set of ideas and methods, which include all aspects of work within the enterprise employed to achieve the development and continuous improvement in quality levels for all products and processes. The goal is to gain the achievement of customer satisfaction and increase production; thus, strengthen the competitive performance of the business. This is possible by focusing on the system of Total Quality management. Doing so to meet the wishes and demands of repeating

¹ Ibid., p 283.

customers and clients; furthermore, performing in a timely manner. Doing so, on the basis that there is a direct correlation between meeting the wishes of the customer and profitability of the project¹.

Total quality management (TQM) is an approach that seeks to integrate all organizational teams by focusing on customer satisfaction and the organizational objectives achieved by implementing quality, productivity and competitiveness. TQM philosophy emphasizes the role of internal and external customers, suppliers and employees involved in pursuing continuous quality improvement².

TQM may be defined as a continuous quest for excellence by creating the right skills and attitudes in people to make prevention of defects possible and satisfy customers/users totally at all times. TQM is an organization-wide activity that has to reach every individual within an organization. Oakland has defined TQM as follows: Total Quality Management (TQM) is an approach to improving the effectiveness and flexibility of business as a whole. It is essentially a way of organizing and involving the whole organization; every department, every activity, every single person at every level³. The previous definition is the optimal definition from the point of view of the researcher, because he took all aspects of the TQM system.

The term total quality management refers to a quest for quality in an organization. There are three key philosophies in this approach. One is a never – ending push to improve which is referred to as continuous improvement; the second is the improvement; of everyone in the organization; and the third is a goal of customer satisfaction, which means meeting or exceeding customer expectations. TQM expands the traditional view of quality –looking only at the quality of the final product or service. TQM – to looking at the quality of every aspect of the process that produces the product of service. TQM systems are intended to prevent poor quality from occurring⁴.

We can describe the TQM approach as follows⁵:

¹ Mohamad Sabri bin Haron, Ali Idiab Mohamed Idiab, Shofian Bin Hj Ahmad, Total Quality Management and Its Relationship with the Internal Audit, Australian Journal of Basic and Applied Sciences, 2012, VOL. 6(9), P 660.

² Carmen NECULA, Op. Cit., p161.

³ R.R. Lakhe, R.P. Mohanty, Op. Cit., pp. 9-10.

⁴ William J. Stevenson, Op. Cit., P 427.

⁵ Ibid., P 427.

- 1- Find out what customers want. This might involve the use of surveys, focus groups interviews or some other technique that integrates the customer's voice in the decision-making process. Be sure to include the internal customer (the next person in the process) as well as the external customer (the final customer).
- 2- Design product or services that will meet (or exceed) what customers want. Make it easy to use and easy to produce.
- 3- Design processes that facilitate doing the job right the first time. Determine where mistakes are likely to occur and try to prevent them. When mistakes do occur, find out why so that they are less likely to occur again. Strive to make the process "mistake-proof". This is sometimes referred to as a fail-safing: Elements are incorporated in product or service design that makes it virtually impossible for an employee (or sometimes a customer) to do something incorrectly.
- 4- Keep track of result, and use them to guide improvement in the system. Never stop trying to improve.
- 5- Extend these concepts throughout the supply chain.

Total Quality management (TQM) is defined both a philosophy and set of guiding principles that represent of foundation of a continuously improving organization. Total quality management integrates fundamental management techniques, technical tools and existing improvements in a disciplined manner. TQM is the art of managing the whole to achieve excellence .TQM is not a program for a specific period, but it is the way of life focused towards continuous improvement of an organization. Total quality management is an approach that tries to achieve and sustain long term organizational success by encouraging employee feedback and participation, satisfying customer needs and expectations, respecting societal values and beliefs, and obeying governmental statutes and regulations¹.

Total Quality Management aims to do things right from the first time, rather than need to fix problems after they emerge or fester .TQM may operate within quality circles, which encourage the meeting of minds of the workforce in different department in order to improve production and reduce wastage. Total quality management means that the organization's culture is defined by and supports the constant attainment of customer satisfaction through an integrated system of tools, techniques and training. This involves

¹ S.R AJARAM, M.SIVAKUMAR, Op. Cit., p 6.

the continuous improvement of organizational processes resulting in high quality product and services¹.

The researcher considers that in TQM as well as in traditional quality management, the focus is on the customer, but not on the quality of the product or service only as in the traditional quality, but through the quality in each of the operations of the enterprise, in addition to the involvement of all employees in the enterprise in quality processes and this process is a continuing improvement process.

3.1.6 THE ESSENTIALS OF TQ:

Quality concepts first appeared with inspection methods in manufacturing, “then to quality control, quality assurance, quality management, Total Quality and currently Total Quality Management”. Works of TQM gurus like Deming, (1986) and Crosby (1979) provide evidences that the TQM evolution started with Japanese and American earlier manufacturing principles, philosophies and strategies².

Deming promoted the concept of “total quality” based on his participation and practical experience with Japanese companies. The main characteristics of this concept are:(Quality must be involved all process phases, Reducing the quality cost most involve all employees, Continuous training, Aligning employee’s goals with organization business goals, Employee commitment, Effective communication between leaders and employee, Continue development).The next phase of TQM evolution was impacted by the significant growth of global free trade. In this phase, TQM became a competitive advantage for business organizations to survive in intensive market. TQM in this phase focused and centered on continuous improvement at all levels business organization. The next phase of TQM is phase focused on business excellence standardized awards frameworks. The most well-known three standardized awards are: The Malcolm Baldrige National Quality Award (MBNQA); The Deming Prize; and European Foundation for Quality Management³.

Over the years, the experts such as Deming, Juran, Shikawa, Crosby, Taguchi, and other, have developed and refined various TQ philosophies and

¹ Ibid., pp. 6-7.

² ESAM MOHAMED AHMED, Impact of Total Quality Management Practices on Innovation in Service Organization, PhD, University Tun Hussein Onn Malaysia, Faculty of Technology Management and Business, 2015, p19.

³ Ibid., p19.

systems .Although their approaches vary somewhat in terms of relative emphasis and techniques, in general, most TQ philosophies share the following characteristic¹:

- Customer –driven quality as the main strategic priority which is based on the presumption that other business goals (such as profit or market share) will follow if costumers are fully satisfied or delighted.
- Visible, effective leadership, where top management places quality ahead of other pressing demands and objective –both symbolically and in day-to-day activities.
- Data-driven processes, where all decisions are made from verifiable data that track changes in performance trends over time.
- Prevention rather than inspection, in which building defect –free performance into product or services design is emphasized, rather than relying on subsequent inspection and rework.
- Employee empowerment, so that authority over delivering or improving products and services is in hand of the 'doers "rather than the overseers.
- Vertical deployment of quality initiatives so that everyone in the organization understands how their work affects key organizational objectives.
- Emphasis on processes and cross-functional coordination as the most likely source of problems and solutions. A process emphasis reduces buck-passing and finger-pointing. And encourages employees to think of themselves as internal customers and suppliers.
- Continuous improvement philosophy, which recognizes that performance can and must always, be improved because the competition never rests.

Five pillars of TQM are²:

- Product
- Process
- System
- People
- leadership

3.1.7 Total Quality Management Philosophies

¹ Arthur A. Thompson, A.J. Strickland III, Tracy Robertson Kramer, Readings in Strategic Management, fifth edition, The Mc Graw-HILL Companies Inc, 1995,the United States of America, p538.

² S.R AJARAM, M.SIVAKUMAR, Op. Cit., p 7.

The core values and concepts of the Criteria for Performance Excellence of the Baldrige National Quality Program form an excellent framework for understanding the philosophies of Total Quality Management. In addition, the Criteria provide an excellent tool for measuring an organization's performance against a well-calibrated standard. As outlined in the Criteria, the TQM philosophy involves eleven interrelated concepts¹:

- 1- Visionary Leadership
- 2- Customer-Driven Excellence
- 3- Agility
- 4- Organizational and Personal Learning
- 5- Management by Fact
- 6- Valuing Employees and Partners
- 7- Focus on the Future
- 8- Managing for Innovation
- 9- Social Responsibility
- 10- Focus on Results and Creating Value
- 11- Systems Perspective

3.1.8 The TQM Pyramid:

The TQM pyramid is an adaptation of the Kanji and Asher pyramid model. It is a proper pyramid with a foundation and four sides and TQM is characterized by five principles²:

1. Management's commitment (leadership).
2. Focus on the customer and the employee.
3. Focus on facts.
4. Continuous improvements (Kaizen).
5. Everybody's participation.

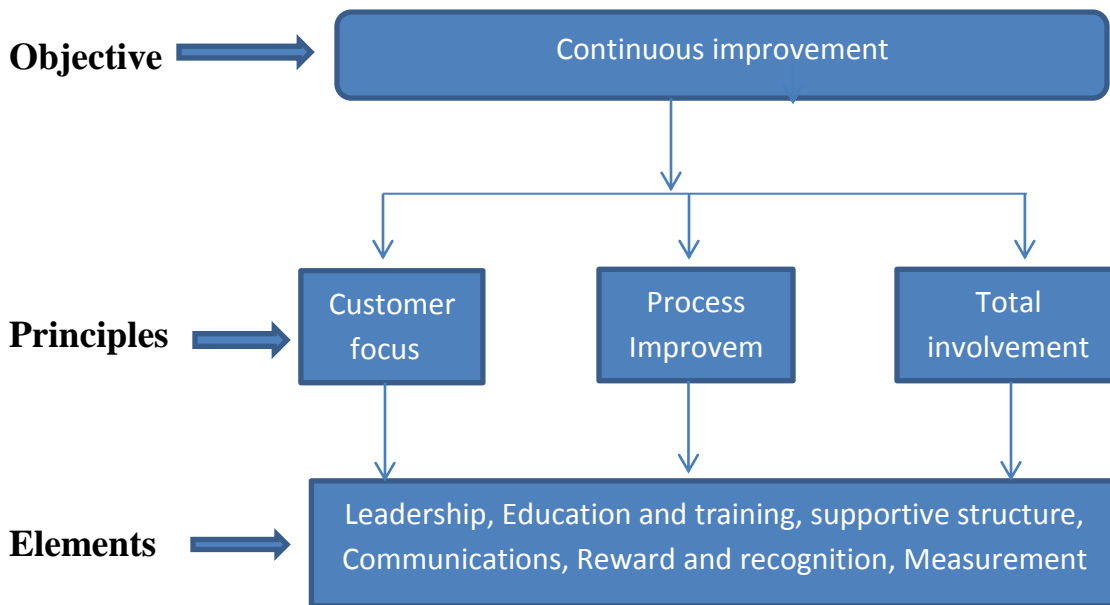
The base or foundation of the pyramid represents management's commitment (leadership) and the four sides are the remaining four principles. A vital task for any management is to outline quality goals, quality policies and quality plans in accordance with the four sides of the TQM pyramid. These goals and policies should be clear and meaningful to all employees in the firm. It is extremely important that the firm's quality goals signal to employees that the firm's principal task is to satisfy its

¹ Melsa, J. L., Principles and Tools of Total Quality Management, Systems Engineering and Management for Sustainable Development - Vol. II, United Kingdoms, 2009, p 123.

² Marcel T. Ngambi, Ayankeng Godlove Nkemkiafu, The Impact of Total Quality Management on Firm's Organizational Performance, American Journal of Management Vol. 15(4) 2015, p 74.

external customers and that this can only be achieved if the firm is able to exceed customers' expectations. Quality goals and quality policies must be followed by meaningful action plans. Experience from firms which have understood and realized the TQM vision shows that firms ought to concentrate on short-term plans (one-year plan) and long-term plans, and the long term plans are often being three-year plans and are revised annually in connection with an annual quality audit¹.

Exhibit (3.1.1): The TQM System



S.R AJARAM, M.SIVAKUMAR, Total Quality Management, Himal Impressions, New Delhi, 2009, p 9.

Any new system in its success and continuity, depends on the support of the administration first, then the education and training of staff and providing the basic needs of this program, secondly, what the basis of this program or its principles which is the participation of all employees in this program and improve the processes to satisfy the customers and thirdly, The process should be regarded as a dynamic, evolving process - a process of constant improvement.

3.1.9 The principles of TQM

¹ Ibid., p74.

There is no agreement on the principles of TQM the principles are varying among different researchers.

1- Management's commitment (leadership):

Management leadership is the most acknowledged and dominant dimensions of TQM strategy. Hitt and Ireland explored that success of management leadership is determined by how leaders can utilize both social and human capital in the process of creating competitive advantage for a firm. According to Chuan and Soon the full commitment and crucial role played by the leadership of top management contribute to the success of any organizational initiatives. Management leadership is based on effective communication, teamwork spirit, empowerment, participative decision making process and effective training of employees¹.

This principle is agreed upon by all researchers and is a fundamental principle for the success of any system in the institution.

2. Focus on the customer and the employee:

Generally, literature provides customer-centered definition of quality. The quality of a product or service is measured on the ability to satisfy stated or implied needs of customers. Evans and Lindsay study portray customer focus as how efficiently the organization determines the current and future need of customers, their requirements and expectations. Customer focus is maintaining close relationship with customers to understand customers and their needs and supplying the products and services to meeting the customer needs is necessary for TQM implementation².

An important factor to achieve goals in firms is Workforce management, Workforce management is emphasized on recognize employee performance on quality; encourage team working; provide training; involve employees in quality decisions. The human resource indicated which includes employee training and employee relation was positively related to quality improvement. A TQM program will be successfully implemented depends on the collaboration and coordination among a firm's workforce. The employees can make timely and more responsive decisions to customers can have a positive impact towards customer relations through increased access to information and resources. Empowering and involving all employees in

¹ Mukhtar Shehu Aliyu, MODELLING TOTAL QUALITY MANAGEMENT DIMENSIONS FOR SME PERFORMANCE, Journal of Education and Social Sciences, Vol. 3, 2016, p 166.

² Masood UI Hassan, et al., An Empirical Assessment of TQM Dimensions and Their Relationship with Firm Performance, World Applied Sciences Journal, VOL. 30 (6), 2014, p 697.

making continuous improvement is essential; under such conditions the organization must ensure that an organization-wide training program is available in order to provide employees with the proper skills¹.

This principle is also agreed upon by the researchers, which is a fundamental principle because the satisfaction of external customers begins with the satisfaction of the staff working on this product or service first.

3. Focus on facts:

This expression signifies that each person involved in the organization must ensure that any decision is based on facts. Management decisions and actions on quality management system is based on the analysis of 'facts' that represent data and information on the performance levels of current products or services provided by the organization and which are obtained from information contained in the audit reports, corrective actions, nonconforming products, customer complaints, etc. Analysis of relevant data based on information reduces the risk decisions based on personal 'opinions'. All documents, information, procedures constitute a proper quality management information system that intertwines, in some areas, with general information system existing in the organization. Those managers must be reserved in making decisions for which there are no verified information in practice².

This principle depends on the clarity of the goals of the organization, as well as the availability of communication techniques and systems to analyze quality information and the availability of accurate and correct information in a proper time so the decisions are made based on facts.

4. Continuous improvements (Kaizen):

Customer's expectations are always changing and typically rising as quality management begins to yield results. It is important to remember that when customers are assessing quality, they are not simply comparing us to our performance last year, but to every other organization that is serving their needs. TQM is mainly concerned with a continuous improvement in all work. It stems from the belief that mistakes can be avoided and defects can be prevented. It leads to continuously improving results, in all aspects of

¹ Abedalfattah Z. Al-abedallat, Ali Bakhit Jaafreh, The Effect of Quality Management Practices on Organizational Performance in Jordan: An Empirical Study, International Journal of Financial Research, Vol. 4, No. 1, 2013, pp. 96-97.

² Andrei DIAMANDESCU, THE MAIN PRINCIPLES OF TOTAL QUALITY MANAGEMENT, Challenges of the Knowledge Society. Economics, The 10th international conference, BUCHAREST, 2016, p 677.

work, as a result of continuously improving capabilities, people, processes, technology and machine capabilities. Continuous improvement must deal not only with improving results, but more importantly with improving capabilities to produce better results in the future¹.

This is also one of the agreed principles among the researchers, since the world is in a state of continuous development and when the institution maintains its current status even if it is at the forefront of institutions, its lack of development may lead to losing its customers and its place in the market because continuous improvement is necessary to keep up with development.

5. Everybody's participation:

This principle consists in developing the capacity to act and to decide individually in solving problems and to engage in quality improvement projects. The staff has the main role at all organizational levels and only by total and conscious involvement and aware is possible that everyone's skills should be involved to achieve quality policy. For this purpose it may act through measures to ensure full motivation of all staff to permanently participate to the process of improvement, innovation, and creativity, thus ensuring the organization's objectives. For the implementation of this principle, it is very important to create an internal environment based on the cult of quality, and for the 'well-done work for the first time and every time'².

One of the agreed principles also, which is an important principle because the achievement of the total quality does not depend solely on the management, but the participation of all employees in the enterprise in the quality process, which satisfies employees and customers.

There are other elements of TQM and some consider them as principles:

6- Process Management:

Process management is important because product quality depends on the process quality. Deming said that improvement in the quality lies in the handling and controlling of the process. Process management deals with how organization applies techniques such as statistical process control,

¹ O.M.HAJA MOHIDEEN, J.VIJAYAVEL, Principles of Total Quality Management (TQM) Governing Automotive Industries with Reference to Skill Enhancement and Capacity Addition, International Journal of Pharmaceutical Sciences and Business Management, Vol.2, NO. 9, 2014, p 38.

² Andrei DIAMANDESCU, Op. Cit., p 674.

prevention orientation, variation reduction and design quality in its processes¹.

7- Learning:

Organizations knowledge and skills are essential for improving quality. Learning is the degree to which organization identify and develop its knowledge base, abilities and skills. It is illustrated by companywide educational development, process knowledge, training, foundational knowledge, managerial learning and continuous self-improvement².

8- Strategic Planning:

Strategic planning refers to the development and subsequent deployment of plans to forge a stronger tie with customers, suppliers and business partners. It includes formulation of vision/mission statements, quality policy, use of quality control and other management tool etc. Appropriate systems of strategic quality planning would improve the product quality and therefore customer satisfaction³.

These three principals have not been agreed among researchers, maybe because they considered among the basic principles. For example, the principle of learning can be considered as part of the principle of continuous improvement because the learning process is continuous and not related to a specific period.

3.1.10 Total Quality Management Tools

There are a wide range of TQM tools, The following is a list of widely used tools used tools. There is no tool that is best for every application the knowledgeable practitioner is aware of a rich variety of tools and uses the appropriate one⁴:

- **Process maps:** One of the important keys to understanding how to improve a process is to map the process. While there are several different approaches to process mapping, the key is to determine who does what at each step of the process. Often, the simple drawing of a process map is sufficient to solve many quality problems because the map makes it so obvious where defects can be introduced.

¹ Masood Ul Hassan, et al., Op. Cit., p 697.

² Ibid., p698.

³ Sin Kit Yeng, Muhammad Shahar Jusoh, Noormaizatul Akmar Ishak, Op. Cit., p 3.

⁴ Melsa, Op. Cit., pp. 122-123.

- **Poke-A-Yoke:** This concept of the Japanese management philosophy is to make a process foolproof. The idea is to design the process in such a way that it is self-checking or incorporates process steps that cause immediate detection and possible correction of any defect. Simple examples include color-coding and special keying of parts to ensure that they are assembled the correct way.

- **Statistical Tools:** One of Deming's major contributions to the quality movement was the introduction of statistically grounded approaches to the analysis of defects. Without the use of these tools, one can often make incorrect decisions regarding the cause of a problem. This can often lead to exactly the opposite effect of that being sought. Included in this set of tools are statistical process control (SPC) charts, Pareto Charts, and histograms.

- **Root Cause Analysis (Five Whys):** The Japanese popularized this tool. It consists of asking a series of questions (whys) until one uncovers the root cause of a defective product. The objective is to determine why a defective product was produced; this is to be contrasted with the usual approach of just fixing the defective product or replacing it.

- **The Plan-Do-Check-Act (PDCA) Cycle:** This tool is also known as the Shewhart Cycle. Deming popularized it in Japan; as a result the Japanese refer to it as the Deming Cycle. The tool emphasizes a new plan for change. It carries out tests to make the change on a small scale, observes the effects, and finally, studies the results to determine what has been learned. The cycle is repeated as needed

- **Brainstorming:** This process has become a staple of the TQM movement. The concept is to invite participants to suggest "solutions" to a problem without any evaluation of the usefulness or correctness of their ideas. Several approaches are possible, including open suggestions, rotating suggestions, or blind suggestions. There are several computer tools that have been developed to assist in this process. After a fixed period of time, or after all suggestions have been made, there is discussion of the "value" of the suggestions.

As mentioned above, there are many of these tools which cannot be determined or arranged according to their importance, but each tool fit a certain thing, and the rest of these tools will be mentioned without explanation as follows;

Force Field Analysis, Fishbone Diagram (Ishakawa Diagram), Loss Functions, Affinity Diagram, Interrelation Digraph, Tree Diagram, Prioritization Matrices, Activity Network Diagram.

3.1.11 Implementation of TQM

The TQ application needs specific requirements to be implemented correctly. There are certain steps when applying TQM may lead to the obstruction of the institution, and those requirements and steps are known as 6C's and 4P's are explained down in table (31.1) and (3.1.2);

The essential requirements for successful implementation are described as the six C's of TQM. These are:

Table (3,1,1): The Six C's of TQM

Commitment	If a TQM culture is to be developed, total commitment must come from top management. It is not sufficient to delegate 'quality' issues to a single person. Quality expectations must be made clear by the top management, together with the support and training required for its achievement.
Culture	Training lies at the center of effecting a change in culture and attitudes. Negative perceptions must be changed to encourage individual contributions and to make 'quality' a normal part of everyone's job.
Continuous improvement	TQM should be recognized as a 'continuous process'. It is not a 'one-time programme'. There will always be room for improvement, however small it may be
Co-operation	TQM visualizes Total Employee Involvement (TEI). Employee involvement and cooperation should be sought in the development of improvement strategies and associated performance measures.
Customer focus	The needs of external customers (in receipt of the final product or service) and also the internal customers (colleagues who receive and supply goods, services or information), should be the prime focus.
Control	Documentation, procedures and awareness of current best practice are essential if TQM implementations are to function appropriately. Unless control procedures are in place, improvements cannot be monitored and measured nor deficiencies corrected.

The Institute of Cost Accountants of India, Business Strategy & Strategic Cost Management, second edition, India, 2014, p 10.81.

It is possible that the organization is led to Total Quality Paralysis, instead of improvement, by improper implementation of TQM. To avoid such disruption and paralysis the following principles (called the four P's) of TQM should be followed¹:

Table (3,1,2): The Four P's of TQM

People	To avoid misdirection, TQM teams should consist of team spirited individuals who have a flair for accepting and meeting challenges. Individuals who are not ideally suited to the participatory process of TQM, should not be involved at all, e.g. lack of enthusiasm, non-attendance at TQM meetings, failure to complete delegated work, remaining a “Mute Spectator” at TQM meetings, etc.
Process	It is essential to approach problem-solving practically and to regard the formal process as a system designed to prevent participants from jumping to conclusions. As such, it will provide a means to facilitate the generation of alternatives while ensuring that important discussion stages are not omitted.
Problem	Problems need to be approached in a systematic manner, with teams tackling solvable problems with a direct economic impact, allowing for immediate feedback together with recognition of the contribution made by individual participants.
Preparation	Additional training on creative thinking and statistical processes are needed in order to give participants a greater appreciation of the diversity of the process. This training must quickly be extended beyond the immediate accounting circle to include employees at supervisory levels and also who are involved at the data input stagey.

The Institute of Cost Accountants of India, Business Strategy & Strategic Cost Management, second edition, India, 2014, p 10.81.

3.1.12 Obstacles to Implementing TQM & Criticisms

3.1.12.1 Obstacles to Implementing TQM

¹ The Institute of Cost Accountants of India, Op. Cit., p 10.3.

Companies have had varying success in implementing TQM. Some have been quite successful, but others have struggled. Part of the difficulty may be with the process by which it is implemented rather than with the principles of TQM. Among the factors cited in the literature are the following¹:

1- Lack of a companywide definition of quality: efforts aren't coordinated; people are working at cross-purposes, addressing different issues, and using different measures of success.

2- Lack of a strategic plan for change: Without such a plan the chance of success is lessened and need to address strategic implication of change is ignored.

3- Lack of a customer focus: Without a customer focus, there is a risk of customer dissatisfaction.

4- Poor intra-organizational communication: the left hand doesn't know what the right hand is doing; frustration, waste, and confusion ensue.

5- Lack of employee empowerment: Not empowering employees gives the impression of not trusting employees to fix a problem, adds red tape, and delays solutions.

6- View of quality as a "quick fix ": quality need to be a long -term, continuing effort.

7- Emphasis on short –term financial results: "duct –tap" solutions often treat symptoms; spend a little now – a lot of more lately.

8- Inordinate presence of internal politics and " turf" issues: these can sap the energy of an organization and derail the best of ideas.

9- Lack of strong motivation: Managers need to make sure employees are motivated.

10- Lack of time to devote to quality initiatives: Don't add more work without adding additional resources.

11- Lack of leadership: Managers need to be leaders.

This list of potential problems can serve as a guideline for organizations contemplating implementing TQM or as a checklist for those having trouble implementing it.

The researcher believes that one of the most important obstacles is the commitment of the administration because the lack of commitment of the administration is certainly the complete failure of this system.

3.1.12.2 Criticisms of TQM:

¹ William J. Stevenson, Op. Cit., Pp. 430-431.

TQM programs are touted as a way for companies to improve their competitiveness, which is a very worthwhile objective. Nonetheless, TQM programs are not without criticism. The following are some of the major criticisms¹:

1. Overzealous advocates may pursue TQM programs blindly, focusing attention on quality even though other priorities may be more important (e.g., responding quickly to a competitor's advances).
2. Programs may not be linked to the strategies of the organization in a meaningful way.
3. Quality – related decisions may not be tied to market performance. For instance, customer satisfaction may be to the extent that its cost far exceeds any direct or indirect benefit of doing so.
4. Failure to carefully plan a program before embarking on it can lead to false starts, employee confusion, and meaningless result.
5. Organizations sometimes pursue continuous improvement (i.e., incremental improvement) when dramatic improvement is needed.
6. Quality efforts may not be tied to results.

It is noted that there is nothing wrong with TQM system, the problem is how the organizations mistake in their implementation or implement it without a deep understanding of the system or what is going on around the organization.

3.1.13 TQM in Developing Nations:

The developing nations are synonymous with poor quality products. Some countries, which centuries ago were recognized as the best manufacturers of quality goods, are now producing shoddy products. This change has taken place because of severe constraints on their economies, lack of political will, lack of education and training and lack of commitment. Studies carried out indicate that the concepts of quality management are not understood by businesses. Often, quality is considered an optional extra. Unfortunately, many enterprises in the developing world have their production function isolated from the quality function. Most organizations in the developing world are suffering from the following²:

- Lack of employee involvement and participation in quality improvement efforts.
- Lack of management commitment and motivation.

¹ Ibid., p 432.

² R.R. Lakhe, R.P. Mohanty, Op. Cit., pp. 15-16.

- Perception that quality is an optional extra and not a necessity for development.
- Traditional belief that “quality costs money”.
- Lack of communication and trust between suppliers, dealers, management and trade unions.
- Unorganized and indifferent customers.
- Lack of political support.
- Lack of established quality standards and inadequate test facilities.
- Obsolete technologies.
- Low level of education.
- Negligible capital investment in technologies, research and development and employees’ education, etc.
- Disrespect to the people so far as quality of life is concerned.
- Undesirable social tensions such as terrorism, violence, religious fundamentalism, etc.

However, with increased competition, changes in global markets, changes in import-export policies and increased customer consciousness, some systematic efforts towards quality are taking place in some of the developing countries. Companies are realizing that not only growth but also, basically, their survival depends on quality matters. Some firms, therefore, are reorienting themselves and, by obtaining the help of foreign collaborators, are trying to give a new boost to the quality drive¹.

The researchers conclude that, the administration's lack of commitment leads to not apply the system and the reasons that prevent management commitment in addition to the belief that the application of this system is a high cost; is the fear of change among the managers and employees. Moreover, there is a gap between academics and researchers and these organizations, there is a lot of researches that has published the culture of total quality and its benefits and constraints, but the organizations do not benefit from these researches.

This section reviewed firstly the quality, assurance, control, and management. Secondly, presented TQM its principles, tools, and obstacles to its implementation and concluded with the management of total quality in developing countries.

¹ Ibid., p 16.

Section Two

The Costs of Quality

3.2.0 Introduction

This section concerns the costs of quality, reviewing background of cost of quality, financial and nonfinancial measures of quality, Quality cost models, Use of cost of quality models in practice, Criticisms of cost of quality systems.

3.2.1 Background

Cost of quality is the amount of money a business loss because its product or services was not done right in the first place. From fixing a warped piece on the assembly line to having to deal with a lawsuit because of a malfunctioning machine or a badly performed service, business loss money every day due to poor quality. For most businesses, this can run from 15 to 30 percent of their total costs. A quality cost is considered to be any cost that the company would not have incurred if the quality of product or service were perfect. As defined by Philip Crosby, cost of quality (COQ) has two main components Cost of conformance, Cost of non-conformance¹.

Quality costs are defined as those costs associated with the non-achievement of product or services quality as defined by requirements established by organization and its contracts with customers and society. In simple terms, quality cost is the cost of poor products or services. Total quality costs are the sum of prevention costs, appraisal costs, failure costs and intangible costs. The costs of quality are the costs that are specifically associated with the achievement or non-achievement of product or service quality².

The idea of quality costing emerged during the 1950s. Juran identified the need to estimate the costs of quality and Feigenbaum presented an approach to categorize those costs into the areas of Prevention, Appraisal and Failure (PAF). Relevant literature presents various terms for quality related costs, most of which are used interchangeably. “Quality is free” according to Crosby and costs only emerge when actions have to be taken if things are

¹ S.R AJARAM, M.SIVAKUMAR, Op. Cit., p 32.

² Belverd E. Needles, Marian Powers, Susan V. Crosson, Financial and Managerial Accounting, Eight Edition, Houghton Mifflin Company, New York, p1265.

not done right the first time. Juran interprets cost of poor quality as the sum of all costs that would disappear if there were no quality problems¹.

The value of quality must be based on its ability to contribute to profits. The goal of most organization is to make money; therefore, decisions are based on evaluating alternatives and the effect each alternative will have on the expense and income of the entity. The efficiency of the business is measured in terms of money. The cost of poor quality can add to the effect each alternative will have on the expense and income of the entity².

The efficiency of the business is measure in terms of money. The cost of poor quality can add to the other costs used in decision making, such as maintenance, production, design, inspection, sales and other activates. The cost of quality is no different than other costs. It can be programmed, budgeted, measured and analyzed to help in attaining the objectives for better quality and customer satisfaction at less cost. A reduction in quality cost leads to increased profit. The cost of quality influences all activities of organization like marketing, purchasing, design, manufacturing and service. There are failures costs associated with lost sales and customer goodwill, which may be impossible to measure and must be estimated³.

All organizations make use of the concept of identifying the costs needed to carry out the various functions – product development, marketing, personnel, production etc., Until the 1950's this cost concept had not been extended to quality function, except for the departmental activities of inspection and testing. During the 1950's the concept of " Quality Cost" emerged. Different people assigned different meanings to the term. Some people equated quality cost with the cost of attaining quality; some people equated the term with the extra incurred due to poor quality. But, the widely accepted thing is "Quality cost is the extra cost incurred due to poor or bad quality of the product or service "⁴.

The researcher concluded that the costs of quality are the total costs that result from preventing the appearance of defects in the product or the costs that result from the presence of products of poor quality. These costs cannot be ignored for their impact on quality and cost at the same time.

¹ Michael Donauer, Henning Mertens, Martin Boehme, Analyzing the Impact of Quality Tools and Techniques on Quality Related Costs: Comparing German Industries, 2015, p 2,<http://kbc-consultants.com>.

² S.R AJARAM, M.SIVAKUMAR, Op. Cit., p 33.

³ Ibid., p 33.

⁴ Ibid., p 34.

3.2.2 Financial Measures of Quality:

Any serious attempt to deal with quality issues must take into account the costs associated with quality. Those costs can be classified into three categories; appraisal, prevention, and failure¹.

1/ **Cost of Prevention:** Prevention costs are the costs associated with the activities conducted to Prevent occurrence of poor quality. These are known as prevention activities that include cost of planning, implementing, and controlling the total quality control system. Prevention activities are also composed of quality planning, marketing and customer analysis, design development for products, purchasing, quality—training and work force development, product—design verification, and system development and management activities. All of these activities aim at preventing producing poor quality products. If companies want zero defects in their products, they have to increase their preventive activities. That is why prevention costs increase as the percentage of defects approaches zero. The more preventive activities are performed, the less the likelihood of producing products with poor quality. Prevention costs are classified and explained in detail as follows²:

- Cost of quality planning: Quality planning entails the process of planning the details of quality system. Quality planning activities includes planning production methods, procedures, and instructions that will be able to translate customer quality requirements into product specifications. Quality planning entails planning for instructions and procedures for test, inspection, and process control. As all these planning activities are conducted in order to prevent the production of inferior products, costs of these activities are included in the prevention costs.

- Cost of marketing research and customer analysis: In order to determine customers' requirements, companies conduct market research. They try to determine customer's needs in order to produce the products that will meet these needs. When the needs of customers are satisfied, it means that the desired quality has been achieved. As marketing research is conducted to prevent the production of products having poor quality, it is accepted as a preventive activity.

¹ William J. Stevenson, Op. Cit., p 420

² İlhan Dalci, Veyis Naci Tanış, QUALITY COSTS AND THEIR IMPORTANCE IN COST AND MANAGEMENT ACCOUNTING, <http://dergipark.gov.tr/download/article-file/50113>, pp. 135-136.

- Cost of developing design for products: Before starting the actual production cost of developing sample products for testing purposes is regarded as of these kinds. This activity of developing sample products aims at preventing the production of products with poor quality. Therefore, these costs are regarded as prevention costs.

- Purchasing costs: In order to ensure the purchase of proper raw materials or components, companies evaluate several suppliers. This activity is performed in order to prevent the company from purchasing inappropriate raw materials. Therefore, all costs related to the evaluation of the suppliers are included in the prevention costs.

- Cost of quality training and personnel development: In order to overcome errors and failures, the personnel of the company is trained. Quality training programs take time and cause some costs. As these programs are conducted to prevent occurrence of poor quality in the production, costs associated to them are regarded as the prevention costs.

- Cost of system development and management: Activities related to managing quality control processes are performed to ensure that the high quality products are offered to the customers. In this case, spending on such things as salaries of managers that are also regarded as the prevention costs causes some costs for the company.

2/ **Appraisal costs (Measurement Costs):** Appraisal costs relate to inspection, testing, and other activities intended to uncover defective products or services¹.

Measurement costs are associated with activities for testing and inspecting the products to ensure that they are in conformance with predetermined quality standards. The more tests and inspections performed the higher the measurement costs. Measurement costs may be listed and explained as follows²:

- Cost of testing and inspecting raw materials: These costs are associated with testing and inspecting purchased raw materials to make sure that these materials are in accordance with the predetermined quality requirements. Such costs as cost of time inspectors or testers are spent to constitute testing and inspecting costs. Also, traveling costs to vendors' plants to evaluate raw materials should be included in these costs.

¹ William J. Stevenson, Op. Cit., p 421.

² İlhan Dalcı, Veyis Naci Tanış., Op. Cit., pp. 136-137.

- Cost of laboratory-acceptance tests: These costs are related to tests provided by the laboratory personnel to evaluate the quality of purchased raw materials. These entail cost of time that personnel spend, cost of materials used to test the raw materials, and depreciation and other costs associated with the equipment used in testing and inspecting materials.
- Inspection costs: These represent the costs related to inspecting the products in the plant, such as wages of clerical and supervisory personnel. Also cost of time spent by the personnel to test the products can be given as an example to these costs. However, these costs exclude the cost of inspecting raw materials that were explained above.
- Testing costs: These entail the costs that are associated with evaluating technical performance of products. Cost of materials used to test the performance of the products may be given as example to testing costs. Other costs related to the supervision and clerical personnel engaged in testing are also included in testing costs.
- Cost of setup for test and inspection: These costs are associated with setting up the products and equipment for testing purposes. In other words, equipment should be prepared for testing the products and costs related to these processes are included in measurement costs. Time related costs, material costs, and others related to the setting up equipment are included in these costs.
- Other costs: Cost of power such as electricity or oil that is used to run testing/inspecting equipment is included in the measurement costs as well. In addition, cost of supplies used and depreciation, lubrication and maintenance associated with testing equipment can also be included in the measurement costs.

It follows from the foregoing that, whenever the company invests on preventive activities, appraisal costs decrease, and If not spend enough money on preventive activities, the possibility of nonconformance to quality increases, Thus increasing the quality of poor products.

3/ **Failure costs:** Failure costs are incurred by defective parts or products or by faulty services. Internal failures are those discovered during the production process; external failures are those discovered after delivery to the customer¹.

¹ William J. Stevenson, Op. Cit., p 421.

A/ Cost of Internal Failure: These costs are associated with activities conducted to deal with the products that are not in consistent with quality requirements. Inferior products cause extra consumption of resources. Extra use of time, supplies, materials and other resources will create extra costs unnecessarily. For example, defective products may be reworked or they may be repaired. Internal failure costs can be examined in detail as follows¹:

- Rework costs: These costs are related to activities taken over to obtain the required level of quality. Extra materials, labor and other resources consumed in repairing the defective products represent rework costs. Rework costs represent the costs associated with replacing and fixing defective products before the delivery to a customer.

- Material-procurement costs: These costs are incurred because of handling both rejects and complaints on purchased materials. They may include getting disposition from vendors.

- Cost of engineering: These costs are associated with time that engineers spend for production problems related to quality. When products are proved to be of poor quality, production process should be reviewed so that cause of poor-quality can be identified. In this case, production process may need to be engineered again to create the environment in which production of inferior products is no longer produced. Since engineering activities are performed to correct quality-related problems, costs related to these activities are internal failure costs.

- Cost of wasted time: Time which employees spend for correcting all of the quality problems will cause extra costs for the company unnecessarily. These cost are caused by the use of time unnecessarily, that is why they are the cost of wasted resources.

B/ Cost of External Failure: These costs are related to dissatisfaction of customers due to nonconformities or defects after product is sold. In other words, external failure costs are incurred if product does not satisfy customers' needs. External failure costs increase as the number of defective units delivered to a customer increases. External failure costs can be classified as follows²:

- Cost of complaints in warranty: When inferior products are sold to customers, company will compensate them if products include warranty.

¹ İlhan Dalcı, Veyis Naci Tanış., Op. Cit., pp. 137-138.

² Ibid., p 139.

Cost of complaint in warranty is associated with investigation, repair, and replacement with regard to complaints within warranty. These costs are associated with resources consumed in investigating and finding solution to customers' complaints. Cost of insurance can be listed under these costs. Also, costs that are spent during the corrections of imperfections are related to warranty.

- Product liability costs: These costs are incurred as a result of liability judgments resulting from quality failures. Customers may sue the company if products they purchase are of poor quality. If customers win the case, company may be forced to compensate these customers for the damages or losses caused by these inferior products.

- Product recall: These costs are incurred as a result of recall of products from the market. When poor quality products are collected from the market, the result is wasted resources used for selling these products. When inferior products are collected from the market, extra resources will be expended to correct them. Therefore, company will incur extra costs.

- Lost sales and reputation: Offering products with poor quality will discourage customers from buying that company's products. Therefore, the company's future sales will probably decline because of poor reputation caused as a result of this. Not only does the company lose sales for the inferior products, it is also likely lose sales for other product lines. These costs are hidden costs because it is very difficult to estimate them.

It could therefore be concluded that, Appraisal and prevention costs represent an investment for preventing poor quality, while internal and external failure costs represent costs of poor quality that means if we invest in the first one we could prevent the second from happening.

Table (3.2.1): Items pertaining to costs of quality reports

Prevention Costs	Appraisal Costs	Internal Failure Costs	External Failure Costs
Design engineering	Inspection	Spoilage	Customer support
Process engineering	Online product manufacturing and process inspection	Rework	Transportation costs
Quality	Product testing	Scrap	Manufacturing/

engineering			process engineering
Supplier evaluations		Breakdown maintenance	Warranty repair costs
Preventive equipment maintenance		Manufacturing/ process engineering on internal failure	Liability claims

Alnoor Bhimani, et al., Management and Cost Accounting, 5th edition, Prentice-Hall Inc, New Jersey, 2012, p 687.

The companies estimate quality costs for the following reasons¹:

- a) To improve communication between middle managers and upper managers (which results when the size of quality problem is quantified in terms of money).
- b) To identify major opportunities for cost reduction.
- c) To identify the opportunities for reducing customer dissatisfaction and associated threats to product salability.

Quality costing serves the following purposes²:

- 1/ As a tool for gaining senior management commitment.
- 2/ As a means of preparing a case for a Total Quality Management initiative.
- 3/ As a tool for highlighting areas for improvement.
- 4/ As a means of providing estimates of the potential benefits to be gained through quality improvement.

There has been a debate among quality leaders about spending on the four types of quality costs as follow;

An important issue in quality management is the value received from expenditure on prevention. There are two schools of thought on this. One is that prevention costs will be outweighed by saving in appraisal and failure costs. This is espoused by such people as Crosby and Juran. They believe that as the costs of defect prevention are increased, the cost of appraisal and failure decrease by much more. What this means, if true, is that the net result is lower total costs, and, thus as Crosby suggests, quality is free. On the other hand, some managers believe that attempting to go beyond a certain point; such expenditures on quality reduce the funds available for other

¹ S.R AJARAM, M.SIVAKUMAR, Op. Cit., p 34.

² Leslie J. Porter and Paul Rayner, Quality costing for total quality management, international Journal of Production Economics, Elsevier Science Publishers B.V.27 (1992), p69.

objectives such as reducing product development times and upgrading technology. The return on quality (ROQ) approach focuses on the economics of Quality efforts. In this approach, quality improvement projects are viewed as investments. And, as such, they are evaluated like any other investment, using metrics related to return on investment (ROI). Approach focuses on the economics of quality efforts. In this approach, quality improvement projects are viewed as investments, and as such, they are evaluated like any other investment, using metrics related to return on investment (ROI)¹.

There are two views on how to consider the dependencies of quality related cost elements: the classical view and the modern view. The classical view presents a cost minimum prior to a perfect quality level. Further investments for better quality will lead to higher costs. The modern model believes that the cost minimum can only be achieved at a 100% conformance level. Costs of delivering products of imperfect quality are tremendously high².

According to relevant literature both views are valid but also strongly challenged. Both concepts are theoretical in nature, and therefore not strictly applicable to a given company in practice. A guide for practitioners is that the modern concept can be interpreted for the mindsets of people and the classic is for established institutions. Whilst targeting a zero defect policy should be aimed for, its implementation is often too demanding to achieve in practice. Therefore, it is mandatory to identify the balance of the right investments in prevention and appraisal activities and poor quality³.

Feigenbaum advocated that quality costs should be expressed as a ratio against sales turnover, production costs or the value of material used. Typically Feigenbaum's costs are related. As appraisal costs rise, failure costs tend to fall. This is because more failures are discovered at an earlier stage. The cost of rectifying a mistake increases as the faulty items proceeds down the production process. In a manufacturing environment, it costs less to reject faulty material at the goods inward stage than it does to scrap a manufactured item that has had the faulty material incorporated into it. However, as further investment is made in appraisal, the reductions in failure costs are likely to decrease. Inspection and other appraisal activities can never be 100% successful. The TQM philosophy is that it is better to prevent the failures from ever occurring in the first place. Accordingly, as time and effort is invested in failure prevention activities, failure costs are reduced

¹ William J. Stevenson, Op. Cit., p 421.

² Michael Donauer, Henning Mertens, Martin Boehme, Op. Cit., p 3.

³ Ibid., p 3.

with no increase in appraisal costs. Thus investment in engineering reviews, plant capability studies and employee training can lead to significant reductions in quality costs. This is particularly important in activities such as the development of computer software where many faults result from inadequate review of client requirements. Boehm has shown that the cost of fixing an error once a computer program has been released to a user is sixty times higher than the cost of fixing it at an initial design review¹.

Schneiderman argued that, in some circumstances, if enough effort is put into prevention, no defects at all would be produced, resulting in zero failure costs and obviating any need for appraisal. In these circumstances, the only optimum point is “zero-defects”. He cites the success of some Japanese organizations in reducing failure costs to very small proportions by the total involvement of all employees in quality improvement as supporting his thesis.

Some organizations have committed themselves to the principle that zero defects can be achieved. At the Martin organization in Florida, Crosby initiated a “zero defects” program to promote in each employee a desire to perform every task “right first time”. This represented a determined effort to motivate employees and to reinforce pride in work and craftsmanship. In spite of its name, however, few departments were allocated immediate targets of zero defects although the aim of the program was for all departments to eventually reach such targets².

Here is an explanation of the traditional and modern Quality cost models in more detail below:

3.2.3 Quality cost models – “traditional” and “new”:

Old CoQ model was firstly proposed by Juran and had been applied extensively till the 90’s. This model suggests that the costs of poor quality (internal and external failure costs) decrease with higher quality levels, while the costs of achieving good quality (appraisal and prevention costs) increase. The total cost function, representing the sum of both cost categories, has a parabolic shape. According to Juran’s interpretation, the resulting cost minimum represents the economically optimal level of quality. The model’s inherent quality–cost trade-off has widely shaped the perception that the optimal level of quality must be somewhere below perfection. Therefore the objective of any quality improvement program should be to find the level of

¹ Leslie J. Porter, Paul Rayner, Op. Cit., p 70.

² Ibid., p 71.

quality (defect rate) that minimizes the total cost of quality. The old COQ model might have gained its wide acceptance because it coincides with an often observed “inspection mentality” of management. However, the view of old CoQ is in conflict with current trends in industry to strive for best possible quality, as the successful quality concept of six sigma demonstrates¹.

To explain the discrepancy between the old CoQ model and current findings in industry, four points must be considered. First, the model obviously presupposes a company with a poor quality level, and does not consider that companies might already have a considerable high quality level when they engage into quality improvement. Second, the model is a spotlight on the technological proficiency of the time it was constructed. The prevention of defects has since become more feasible due to technological advances, which benefits both the finding of feasible remedies and the methods of process monitoring. Third, the model makes no reference to the duration for which a company has been engaged in quality improvement. Fourth, the unit cost consideration makes a strong point that the exponential shape of the ‘costs of achieving good quality’ curve is unrealistic. At higher quality levels, more good products are available to bear the costs of both prevention and appraisal².

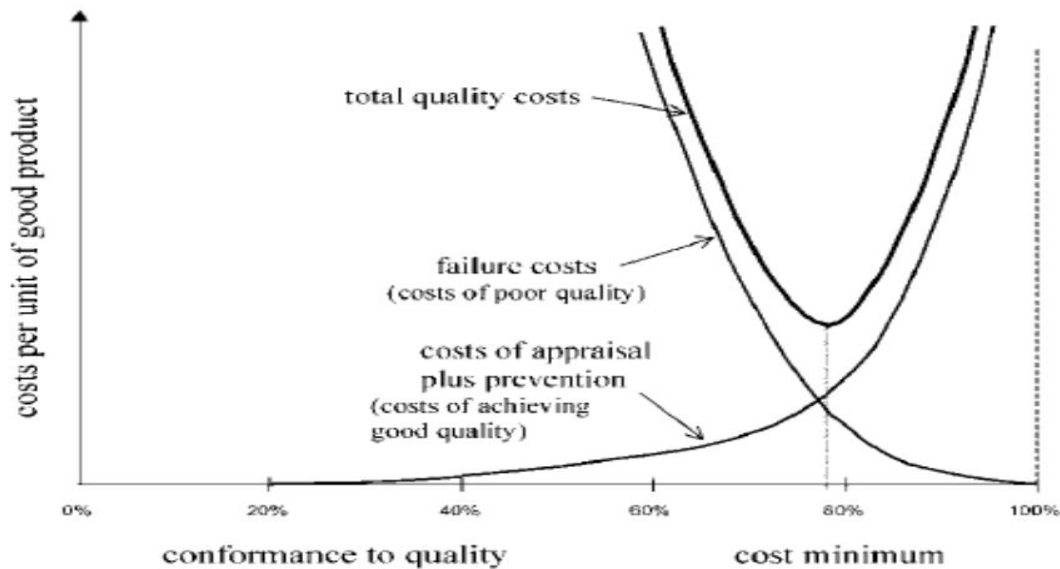
The so-called new CoQ model which is more in agreement with empirical findings from industry, it exhibits a weaker increase in appraisal and prevention costs, accounting for a higher prioritization of prevention and new technological solutions that reduce the failure rate and make process monitoring feasible. The total cost curve is negatively sloped and the cost optimum shifts to the perfect quality level. In fact, the new COQ model reflects Deming’s viewpoint that we do not need a CoQ model to determine an optimal level of quality. Deming asserts that the costs of selling defective products is so high that quality costs will only be minimized when there is 100% conformance, or zero defects. Consequently, he thinks that there is no reason to measure quality costs since the only sensible strategy is to be sure that no defective products are produced at all. In general, it is accepted that the new COQ model presents a much more rounded perspective on quality costs and seems to reflect business reality much closer than the old model, at

¹ N. M. VAXEVANIDIS, G. PETROPOULOS, A Literature Survey of Cost of Quality Models, Journal OF ENGINEERING, ANNALS OF THE FACULTY OF ENGINEERING HUNEDOARA, 2008, VOL 3, p 277.

² Ibid., p 277.

least for “world-class” organizations. However, there is also a criticism that both models are of a limited value¹.

Figure (3,2,1): The old CoQ model

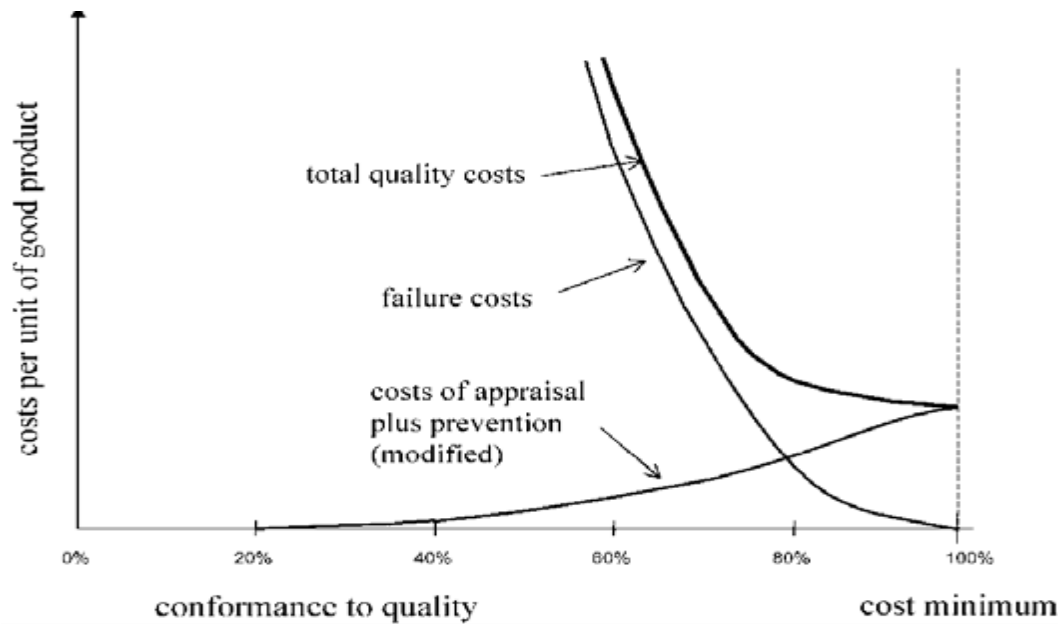


Source: N. M. Vaxevanidis, G. Petropoulos, A Literature Survey of Cost of Quality Models, Journal of Engineering, Annals of The Faculty of Engineering Hunedoara, 2008, VOL. 3, p 277.

Figure (3,2,1) shows that, the more the line of appraisal and prevention cost goes up the more the degree of conformity of the product with the quality, while the higher the costs of failure, the lower the degree of conformity of the product with the quality, and with the rise of each curve increase the total cost of the product. The point at which the failure cost line intersects the line of appraisal and prevention costs represents the lowest possible cost for the total cost of the product, this lowest cost cannot be equal to zero.

Figure (3,2,2): The old CoQ model

¹ Ibid., pp. 277-278.



Source: N. M. Vaxevanidis, G. Petropoulos, A Literature Survey of Cost of Quality Models, Journal of Engineering, Annals of The Faculty of Engineering Hunedoara, 2008, VOL. 3, p 277.

Figure (3,2,2) shows that, the more the line of appraisal and prevention cost goes up the more the degree of conformity of the product with the quality, and the higher the costs of failure, the lower the degree of conformity of the product with the quality. But the more the line of failure increases the more the total cost of the product increase, while an increase in the cost of the appraisal and prevention decreases the total cost of the product. The point at which the line of appraisal and prevention costs intersects the line of the total cost of the product represents the lowest possible cost of the total cost of the product, while representing the highest cost for the appraisal and prevention cost.

3.2.4 A review of quality cost models:

Since Juran discussed the cost of quality, many researchers have proposed various approaches to measuring CoQ. In agreement with the majority of previous researchers present work classifies CoQ models into five discrete generic groups which are¹: P-A-F or Crosby's model, opportunity cost models, process cost models and ABC models. These models are summarized in Table (3,2,2). Obviously, models within one group are not identical.

¹ Ibid, p 274.

Table (3,2,2): Generic CoQ models and cost categories

Generic model	Cost/activity categories
P-A-F models	Prevention + appraisal + failure
Crosby's model	Prevention + appraisal + failure + opportunity
Opportunity or intangible cost models	Conformance + non-conformance Conformance + non-conformance + opportunity Tangibles + intangibles P-A-F (failure cost includes opportunity cost)
Process cost models	Conformance + non-conformance
ABC models	Value-added + non-value-added

N. M. Vaxevanidis, G. Petropoulos, A Literature Survey of Cost of Quality Models, Journal of Engineering, Annals of The Faculty of Engineering Hunedoara, 2008, VOL 3, p275.

The following is an explanation of each method:

1/ Feigenbaum P-A-F Model:

Most CoQ models are based on the P-A-F classification. It was Armand Feigenbaum, who in 1943 first devised a quality costing analysis when he and his team developed a dollar-based reporting system. Joseph Juran (1951) initiated the concept of quality costing, the economics of quality and the graphical form of the CoQ model. and Armand Feigenbaum (1956) later proposed the now widely accepted quality cost categorization of prevention, appraisal and failure (internal and external) costs. Prevention costs are associated with actions taken to ensure that a process provides quality products and services, appraisal costs are associated with measuring the level of quality attained by the process, and failure costs are incurred to correct quality in products and services before (internal) or after (external) delivery to the customer. Juran later highlighted the traditional tradeoff that contrasts prevention plus appraisal costs with failure costs¹.

¹ Andrea Schiffauerova, Vincent James Thomson, A review of research on cost of quality models and best practices, International Journal of Quality & Reliability Management, VOL. 23(6), 2006, P 4.

After Feigenbaum categorized quality costs into prevention-appraisal-failure (PAF), the PAF scheme has been almost universally accepted for quality costing. The failure costs in this scheme can be further classified into two subcategories: internal failure and external failure costs. The basic suppositions of the P-A-F model are that investment in prevention and appraisal activities will reduce failure costs, and that further investment in prevention activities will reduce appraisal costs. The objective of a CoQ system is to find the level of quality that minimizes total CoQ. Feigenbaum's and Juran's P-A-F scheme has been adopted by the American Society for Quality Control in 1970 and the British Standard Institute, and it is employed by most of the companies which use quality costing¹.

In spite of the simplicity of the traditional approach and the ease of understanding it, its implication practically faces two problems:

The first problem is the problem of measurement accuracy in measuring failure costs that do not appear in the accounting records and must be determined on an estimated basis. The second problem is the problem of determining the balance point. This problem arises because of the difficulty of the practical determination of the point at which the expenditure must be stopped on the conformance activities against the savings in the costs of the nonconformance and the total cost of the quality at the minimum².

2/ Crosby's model:

Crosby sees quality as "conformance to requirements" and therefore, defines the CoQ as the sum of price of conformance (PoC) and price of non-conformance (PoNC). The price of conformance is the cost involved in making certain that things are done right the first time, which includes actual prevention and appraisal costs, and the price of non-conformance is the money wasted when work fails to conform to customer requirements, usually calculated by quantifying the cost of correcting, reworking or scrapping, which corresponds to actual failure costs³.

The cost categories of Crosby's model are similar to the P-A-F scheme. Crosby sees the cost of quality as the sum of price of conformance (prevention and appraisal) and price of non-conformance (failure costs), the P-A-F model are that investment in prevention and appraisal activities will reduce failure costs, it is only a different terminology.

¹ N. M. VAXEVANIDIS, G. PETROPOULOS, Op. Cit., p 274.

² Ahmed Hussein, Advanced Management Accounting for Strategic Thinking, Egypt, 2013, p 151.

³ N. M. VAXEVANIDIS, G. PETROPOULOS, Op. Cit., P 274.

3/ Intangible costs' models:

The importance of opportunity and intangible costs has been recently emphasized. Intangible costs are costs that can be only estimated such as profits not earned because of lost customers and reduction in revenue owing to non-conformance. Sandoval-Chavez and Beruvides incorporate opportunity losses into traditional P-A-F quality expenses. According to them, opportunity losses may be broken down into three components: underutilization of installed capacity, inadequate material handling and poor delivery of service. They express total CoQ as revenue lost and profit not earned. Carr includes opportunity cost and reports evidence of its successful use in a quality program. Quality costs are defined in three categories: the cost of conformance, the cost of non-conformance and the cost of lost opportunity. Other authors address the cost of lost costumers derived from product failures that reach the market. Juran's model also recognizes the importance of intangibles. His CoQ scheme includes two measurable cost categories: tangible factory costs and tangible sales costs, and he suggest the inclusion of intangible internal benefits. Kim and Liao have extended the usefulness of this concept by developing various forms of quality loss functions and have showed how different loss functions can be used for measuring hidden quality costs for any variation of the actual value from the target value of designated characteristics of a product¹.

This model added to the known classification conformance and non-conformance the third classification of intangible costs of quality, which is not negligible, but the problem remains how to measure these costs and how to show it.

4/ Process cost model:

In view of a number of drawbacks of the P-A-F model, the process cost approach, can be used as an alternative. This approach recognizes the importance of process cost measurement and ownership. The process cost is the total of the cost of conformance (CoC) and the cost of nonconformance (CoNC) for a particular process. The CoC is the actual process cost of providing products or services to the required standards, first time and every time, by a given specified process. The CoNC is the failure cost associated with a process not being operated to the required standard. According to this definition, we know that the content of this categorization (CoC and CoNC) is different from that of Crosby's (PoC and PoNC) mentioned previously².

¹ Andrea Schiffauerova, Vincent James Thomson, Op. Cit., p 5.

² N. M. VAXEVANIDIS, G. PETROPOULOS, Op. Cit., p 274.

The process modeling method called IDEF (the computer-aided manufacturing integrated program definition methodology) developed by Ross (1977) is useful for experts in system modeling; nevertheless, for common use by managers or staff it is too complex. Simpler methods were developed to overcome this limitation. Goulden & Rawlins utilize a hybrid model for process quality costing where flowcharts are used to represent the main processes. The use of a process cost model is suggested as a preferred method for quality costing within total quality management (TQM) as it recognizes the importance of process cost measurement and ownership, and presents a more integrated approach to quality than a P-A-F model. Goulden & Rawlins also suggest that analysts place emphasis on the cost of each process rather than on an arbitrarily defined cost of quality under a P-A-F model. Moreover, the quality cost categorization is simpler and some researchers argue that it is also more relevant than the P-A-F scheme. The process model has wider application in that it facilitates the collection and analysis of quality costs for both direct and indirect functions. However, the process cost model is not in widespread use¹.

The non-spread and non-use of this model may be due to its complexity, In terms of these models is appropriate more than the previous models, it is due to many other factors that may be convenient for the big companies and inconvenient for others.

5/ ABC models:

Existing accounting systems are usually considered as poorly fitted for generating reports on quality measurements. They do not provide appropriate quality related data, and benefits resulting from improved quality are not measured.. Although most CoQ measurement methods are activity/process oriented, traditional cost accounting establishes cost accounts by the categories of expenses instead of activities. Thus, many CoQ elements need to be estimated or collected by other methods. There is no consensus method on how to allocate overheads to CoQ elements and no adequate method to trace quality costs to their sources. An activity-based costing (ABC) model was developed by Cooper and Kaplan 1988 to solve this problem. Under ABC, accurate costs for various cost objects are achieved by tracing resource costs to their respective activities and the cost of activities to cost objects. The ABC approach is actually not a CoQ model. It is an alternative approach that can be used to identify, quantify and allocate quality costs among products, and therefore, helps to manage

¹ Andrea Schiffauerova, Vincent James Thomson, Op. Cit., p 6.

quality costs more effectively. Tsai proposes an integrated CoQ-ABC framework, in which ABC and CoQ systems are merged and share a common database in order to supply various cost and nonfinancial information for related management techniques. The long-term goal of ABC systems is to eliminate non-value added activities and to continuously improve processes, activities, and quality so that no defects are produced¹.

ABC uses the two-stage procedure to achieve the accurate costs of various cost objects (such as departments, products, customers, and channels), tracing resource costs (including overhead costs) to activities, and then tracing the costs of activities to cost objects².

Although some researchers believe that this model can address the shortcomings of previous models, this system of ABC is also a complex system and has been criticized, in addition, after this system emerged many systems that can manage costs better than this system.

3.2.5 Use of COQ Models in Practice:

No matter how great the interest of the academic community in CoQ models is, and how much theoretical information and practical advice can be found, the situation in the real world is different. The results of numerous industry surveys or research studies confirm that CoQ is not a widely used. Quality cost calculations are not common even among the recipients of the Malcolm Baldrige National Quality Award. Quality guru Philip Crosby states that nothing in his 30 years of work as a quality professional has disappointed him as much as the way the concept of CoQ is not used. He adds that he “has never seen a company that had its cost of quality figured out right or used properly”. Companies rarely have a realistic idea of how much profit they are losing through poor quality. Smaller firms most often do not even have any quality budget and do not attempt to monitor quality. Large companies usually claim to assess quality costs, even though most managers claim that quality is their top priority, only a small number of them really measure the results of quality improvement programs³.

¹ Schiffauerova A., Thomson V., “A review of research on cost of quality models and best practices”, *International Journal of Quality and Reliability Management*, Vol.23, No.4, 2006, p 6.

² N. M. VAXEVANIDIS, G. PETROPOULOS, *Op. Cit.*, p 275.

³ Andrea Schiffauerova, Vince Thomson, *A Review of Research on Cost of Quality Models and Best Practices*, *International Journal of Quality and Reliability Management*, Canada, Vol.23, No.4, 2006, pp.7-8.

Tom Groot, Frank Selto summarized the usage of COQ Models in reality in points, and mention the situation is much more complicated¹:

1/ quality costs are not systematically recorded in companies, which makes it difficult to come up with reliable cost figures for each of the four cost categories.

2/ most cost categories are not stable in practice: prevention activities can currently be factored into production systems, which may lower both prevention and inspection costs simultaneously.

3/ our economic model almost exclusively focus on additional, direct and tangible costs of quality performance. Quality costs cannot be considered a separate cost category. Most quality efforts are expected to also lower production costs. They result into less rework, a reduction in down time, a better use of production time and materials, which lead to higher productivity.

4/ a considerable portion of quality costs are opportunity costs: substandard products may cause customers to prefer other products, they may do harm to the brand image of the products and may put the competitive position of the firm at danger. Not only in the short term, but also in the long term, these may add considerable amounts of quality costs (which we have labeled external failure cost).

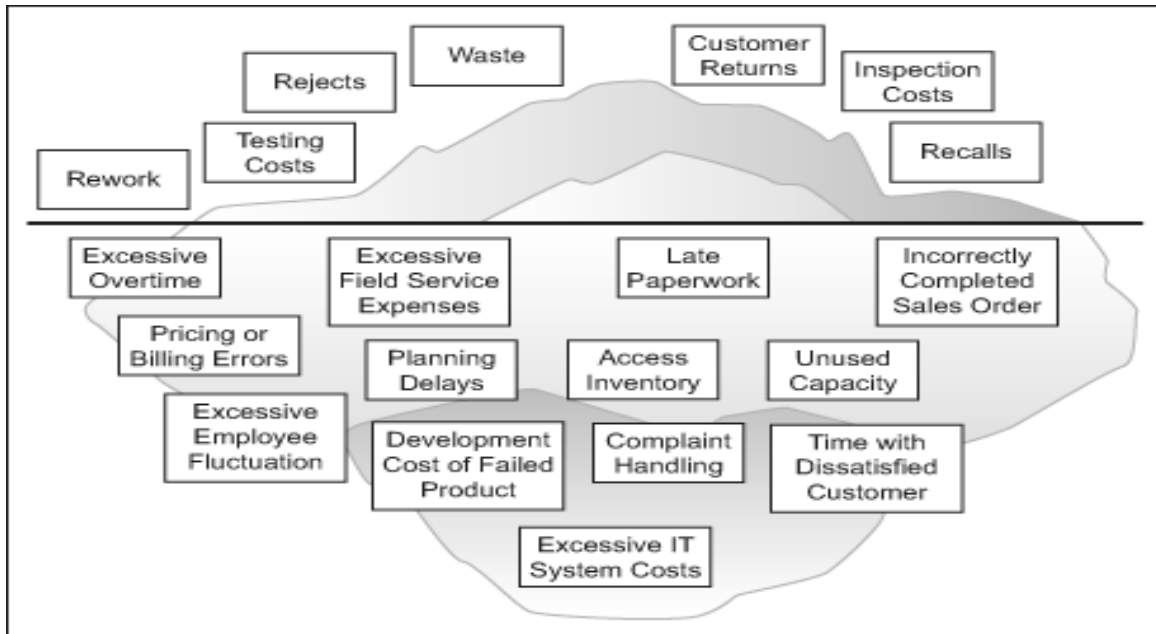
3.2.6 Visible – Invisible cost of poor quality:

Some Costs of Poor Quality can be difficult to identify and measure, since when traditional managerial accounting systems are structured poorly, there is a risk that only a small amount of the costs will be found, but represented as the Total Cost of Poor Quality (CoPQ) in a company, which will lead to a false picture of the effects of poor quality. The costs that are easily found by the accounting system and whose effects are known are visible costs. The opposite of these are invisible costs, also called hidden or intangible. They are difficult to find and measure in numbers, since they are not revealed directly by the accounting systems however, these costs cannot be unnoticed or ignored, because they affect the business heavily. Visible and invisible CoPQ can be visualized as an iceberg Figure (3.2.1)².

Figure (3.2.1) The iceberg of Visible – Invisible cost of poor quality

¹ Tom Groot, Frank Selto, *Advanced Management Accounting*, Pearson, Edinburgh, 2013, pp. 287-288.

² Oksana Vysochynska, *TOTAL COST OF POOR QUALITY*, Bachelor's degree in Business Administration, University of South-Eastern Norway, 2016, p10.



Marcus Thomasson, Johanna Wallin, Cost of Poor Quality; definition and development of a process-based Framework, CHALMERS UNIVERSITY OF TECHNOLOGY, Master of Science Thesis in the Master Degree Programme Quality and Operations Management, 2013, p 17.

A major part of invisible CoPQ is unrecognized in companies due to that they are neither measured nor reported. Further, invisible costs are unrecognized due to that the costs are inadequately registered in the organization or not discovered at all. As a consequence, management decisions are often based on the information of visible costs. The authors differently describe the amount of invisible CoPQ, where Gryna states that invisible CoPQ is three or four times of visible costs while Krishnan states that invisible CoPQ can be as high as three to ten times visible costs¹.

As long as these invisible costs are by the size mentioned before, they must be measured so that they can be managed and controlled, but the problem remains how to measure invisible activity. But that never means we should ignore it, but we must be carefully estimated so they are easily managed.

3.2.7 Nonfinancial Measures of Quality:

Nonfinancial measures of performance, identified and reported to managers in a timely manner, are used to supplement cost-based measures. Although

¹ Marcus Thomasson, Johanna Wallin, Cost of Poor Quality; definition and development of a process-based Framework, CHALMERS UNIVERSITY OF TECHNOLOGY, Master of Science Thesis in the Master Degree Programme Quality and Operations Management, 2013, p 17.

cost control is still an important consideration, a commitment to ongoing improvement encourages activities that enhance quality at every stage, from design to delivery. Those activities, or cost drivers, cause costs, by controlling the leading nonfinancial performance measures of activities, managers can ultimately maximize the resulting financial return from operations. The five categories of nonfinancial measures of quality are¹:

1/ Product Design: problems with quality often are result of poor design. Most automated production operations used computer-aided design (CAD), a computer-based engineering system with a built-in program to detect product design flaws. Such computer programs automatically identify poorly designed parts or manufacturing processes, which means that engineers can correct these problems before production designs. Managers monitor the CAD reports on design flaws to ensure that products are properly designed and free of defects. Among the measures that they consider are the number and types of design defects detected, the average time between defect detection and correction, and the number of unresolved design defects at the time of product introduction.

2/ Vendor Performance: companies have recently changed the way they do business with suppliers of materials. Instead of dealing with dozens of suppliers in a quest for the lowest cost, companies now analyze their vendors to determine which ones are most reliable, furnish high-quality goods, have a record of timely deliveries, and charge competitive prices. Once a company has identified such vendors, they become an integral part of the production team's effort to ensure a continuing supply of high-quality materials. Vendors may even contribute to product design to ensure that the correct materials are being used. Managers use measures of quality (such as defect-free materials as a percentage of total materials received) and measures of delivery (such as timely deliveries as a percentage of total deliveries) to identify reliable vendors and monitor their performance. The goal in doing so is to ensure that high-quality, reasonably priced materials are available when are they needed.

3/ Production Performance: management must always be concerned about the wasted time and money that can be traced to defective products, scrapped parts, machine maintenance, and downtime. To minimize such concerns, more and more companies have adopted computer-integrated manufacturing (CIM) systems, in which production and its support

¹ Belverd E. Needles, Marian Powers, Susan V. Crosson, Op. Cit., pp. 1267-1269.

operations are coordinated by computers. Within a CIM system, computer-aided manufacturing (CAM) may be used to coordinate and control production activities, or a flexible manufacturing system (FMS) may be used to link together automated equipment into a computerized flexible production network. In CIM systems, most direct labor hours are replaced by machine hours, and very little direct labor cost is incurred. In addition, a significant part of variable product cost is replaced by the cost of expensive machinery, a fixed cost. Today, the largest item on a company's balance sheet is often automated machinery and equipment. Each piece of equipment has a specific capacity, above which continuous operation is threatened.

4/ Delivery Cycle Time: companies today are extremely interested in the amount of time they take to respond to customers. To evaluate their responsiveness to customers, companies examine their delivery cycle time which is the time between the acceptance of an order and the final delivery of the product or service. When a customer places an order, it is important for a salesperson to be able to promise an accurate delivery date. A company's goal is to fill its orders 100 percent of the time and to deliver its products 100 percent on time. To meet this goal, a company must establish and maintain consistency and reliability within its production process and be highly aware of its delivery cycle time. Companies pay careful attention to delivery cycle time not only because on-time delivery is important to customers, but also because a decrease in delivery cycle time can lead to significant increase in income from operations. Delivery cycle time consists of purchase-order lead time (the time it takes a company to process an order and organize so that production can begin), production cycle time (the time it takes to make a product) and delivery time (the time between the completion of a product and its receipt by the customer). Managers should establish measures that emphasize the importance of minimizing the purchase-order lead time, production cycle time, and delivery time for each order. Trends should be highlighted, and reports should be readily available. Other measures design to monitor delivery cycle time include order backlogs, on-time delivery performance, percentage of orders filled, and waste time. Waste time is the production cycle time - (average process time + average setup time).

5/ Customer Satisfaction: the sale and shipment of a product does not mark the end of performance measurement. Customer follow-up helps in evaluating total customer satisfaction. Measures used to determine the degree of customer satisfaction include; (1) the number and type of customer complaints, (2) the number and causes of warranty claims, and (3) the

percentage of shipments returned by customers (or the percentage of shipments accepted by customer). Several companies have developed their own customer satisfaction indexes from these measures so that they can compare different product lines over different time periods.

The researcher believes that, each of these five considerations represents non-financial quality measures. Any imbalance in one of these measures affects quality and customer dissatisfaction clearly, but also has an unclear financial impact on the institution. For example, the problem of poor design, or delay the delivery of an order, these problems affect the reputation of the company, leading to the loss of a number of customers, thus losing part of their revenues.

3.2.8 Usage of quality costing:

Quality costing can be used as a lever to gain top management commitment to initiate an improvement project. Top managers tend to be influenced by data expressed in monetary terms rather than technical data such as defect rates. Their main area of interest can be reflected as a strategic business objective in a company. Their commitment is decisive for the success of a TQM initiative because many resources should be invested in quality improvement projects. In addition to providing a communicating bridge between line and top management, quality costing can provide an overall index for managers to evaluate and monitor the economics, effectiveness and efficiency of quality activities in their organization. Quality costing integrates all the separate quality activities into a total quality system. It forces the entire organization to examine the performance of each quality activity in terms of costs. Moreover, quality costing can be used as a starting point in setting up a quality system except where an organization already has one. It should be also noted that the usefulness of CoQ reporting does not have consensus in the literature. Three noted authors on quality management (“gurus”), namely Deming, Crosby, and Juran, each have a different attitude to CoQ reporting (as outlined in. Deming’s view is that cost analysis for quality is a misguided waste of time and measuring quality costs to seek optimum defect levels is evidence of failure to understand the problem. Crosby argues that quality costs need to be measured, not for management control, but for the development of “quality” thinking within the organization. The more popular approach is that of Juran who advocates the measurement of costs on a periodic basis as a management control tool¹.

¹ N. M. VAXEVANIDIS, G. PETROPOULOS, Op. Cit., p 281.

The researcher believes quality measurement is very important, because seeing the cost of quality in the form of numbers, whether prevention, appraisal or failure cost, it has an impact on management. When the administration can measure the failure of its products in the form of figures, the administration will certainly work to address that failure, and look for ways to improve.

3.2.9 Criticisms of COQ systems:

Montgomery suggests that the principle purpose of a cost of quality (COQ) system is cost reduction through identification of improvement opportunities. A number of companies testify to the effectiveness of COQ systems in reducing costs. However, Montgomery also lists a number of reasons why many quality cost programs fail: using COQ information as a scorekeeping tool rather than as a driver for, continual improvement; preoccupation with perfection in determining the COQ figures; and underestimation of the depth and extent of commitment required to be made to prevention. Shepherd suggests that one of the setbacks to the application of COQ has been that costs of failure are often based on costing variances which hide specific issues such as increases in scrap rates by the standard being adjusted to allow for a greater usage level. Johnson found a number of quality practitioners who viewed COQ systems as “administrative nightmares and as impediments to quality rather than as contributors to quality”. Based on interviews with quality professionals, he attributes many COQ system failures “to poor management planning, implementation, and follow-up” rather than to flaws in the COQ concept itself. Merino, while finding no fault with the COQ concept, identifies difficulties in its application. One problem he cites is inadequate cost accounting methods, which are unable to deal effectively with an ever changing, highly automated manufacturing environment. He suggests that one reason that prevention costs are usually the smallest category of COQ is because outdated accounting systems are unable to provide management with the ability to evaluate the profit results from prevention activities such as planning, designing and communicating¹.

The researcher concludes that the defect is the difficulty of application but the problem is not in COQ concept as mention above. Therefore, companies can try to apply the concept gradually to address the difficulty of application.

¹ Victor E. Sower, Ross Quarles, Eric Broussard, Cost of quality usage and its relationship to quality system maturity, International Journal of Quality & Reliability Management, Emerald, USA, Vol. 24 No. 2, 2007, p 125.

3.2.10 Reported Quality Costs in Industries:

Schiffauerova and Thomson, provide a comprehensive review on research on cost and quality models and best practices. They conclude that acquiring quality cost data is an important and beneficial exercise. Companies using quality cost based programs successfully reduced quality costs and improved quality for customers. However getting access to real-world data is a challenge. There are only a limited number of papers dealing with quantitative data regarding quality costs and much of this data appears to be fictitious. Getting access to real-world data is a challenge because it provides transparency over companies cost structure. More importantly the delicate topic of poor quality impacts negatively the company's image when reported to the public. There is no unique method of performing the cost gathering exercise and each costing system must be tailored individually to the company. It is not clear whether other cost categories such as opportunity costs and hidden costs are included or not. Additionally, differences in cost category distribution and their total amount depend on the size of the firm. Usually larger firms have implemented a more mature quality system and show lower Total Quality Costs (TQC). Therefore, if cost calculation and reporting structures are different, comparisons across companies and industries must be made with caution. All these warnings led to the authors taking great care in choosing and evaluating sources containing real-world quality cost data¹.

The researcher presented in this section, the cost of quality represented the models of COQ, the categories, usage of quality costing, the financial and nonfinancial measures of quality, and criticisms of COQ systems, the researcher concluded that despite the criticism directed to COQ systems, but it's still the application of it can positively affect the company.

¹ Michael Donauer, Henning Mertens, Martin Boehme, Op. Cit., p 3.

Chapter Four

Strategic Cost Management

Over the past 50 years, global competition has developed to a level where technology, quality, customer service, and delivery are no longer sufficient to differentiate world-class companies. In order to achieve and maintain a sustained competitive advantage, firms must now provide all of the above at a lower cost than their competitors. Strategic Cost Management 'which is the process of reducing total costs while improving the strategic position of a business' thus becomes a necessary element for companies today and, more companies are looking for ways to implement strategic cost management. This chapter discussed Strategic Cost Management, reviewing some basic terms and concepts and the techniques of Strategic Cost Management, this was done through two sections as follows:

Section One: Overview and Basic Concepts

Section Two: Strategic Cost Management Techniques

Section One

Overview and Basic Concepts

4.1.0 Introduction

This section concerns Strategic Cost Management, reviewing the concept of strategic cost management, factors influencing strategic cost management, the difference between traditional cost management and strategic cost management, cost control and cost reduction.

4.1.1 Definition of Strategic Cost Management (SCM)

Strategy is the determination of the basic long-term goals and the objectives of an enterprise, and the adoption of courses of action and the allocation of resources for carrying out these goals¹.

Strategy specifies how an organization matches its own capabilities with the opportunities in the marketplace to accomplish its objectives. In other words, strategy describes how an organization can create value for its customers while differentiating itself from its competitors².

Management is a process of planning, organizing and staffing, directing, and controlling activities in an organization in a systematic way in order to achieve a common goal³.

Cost is the portion of the expense that is applied in the production or in any other function. Cost is the value accepted by the buyer for buying a specific good or is the sum of all aggregate values of a product since its acquisition until it reaches the marketing stage⁴.

Strategic management can be defined as the art and science of formulating, implementing, and evaluating cross-functional decision that enable an organization to achieve its objectives⁵.

¹ Darius Gliubic, Rasa Kanapickiene, Contingencies Impact On Strategic Cost Management Usage In Lithuanian Companies, 20th International Scientific Conference Economics and Management, Procedia - Social and Behavioral Sciences, Vilnius University, Lithuania, 2015, VOL. 213, P256.

² Srikant M. Datar, Madhav V. Rajan, Managerial Accounting – Making Decisions and Motivating performance, Pearson Education Inc. U.S.A. 2014, p584.

³ Ramon j. aldag, Timothy M. Sterns, Management, south-western publishing co., U.S.A, 1987, p11.

⁴ Mario Fernando, Amanda Barbosa, The Importance of Cost Management in A Manufacturing Company of Hydroelectric Plants - A Case Study, Brazilian Journal of Operations & Production Management, VOL. 13, 2016, p 94.

⁵ Fred R. David, Strategic Management – Concepts & Cases, Prentice-Hall, Inc7th ed. U.S.A, 1999, P5.

Strategic management consists of the analysis, decisions, and actions an organization undertakes in order to create and sustain competitive advantages. This definition captures two main elements that go to the heart of the field of strategic management¹:

First, the strategic management of an organization entails three ongoing processes; analysis, decision, and action.

Second, the essence of strategic management is the study of why some firms outperform others.

As illustrated above, strategic management is examine the organization's internal and external environment, set goals and develops effective future plans to achieve those goals.

After each definition of strategy, management, cost, and strategic management, then we define strategic cost management (SCM), which has several definitions:

According Simmonds SCM is the provision and analysis of management accounting data about a business and its competition for the use in developing and monitoring the business strategy, particularly relating levels and trends in real cost and prices, volumes, market share and proportioned demanded of a firm total resources. Certified Institute for Management Accounting defines SCM as a form of management accounting in which emphasis is placed on information which relates to factors external to the entity, as well as non-financial information and internally generated information. Langfield & Smith defines SCM as taking a strategic orientation to the generation, interpretation and analysis of management accounting information and competitor's activities².

Strategic Cost Management: SCM is the process of identifying, accumulating, measuring, analyzing, interpreting, and reporting cost information useful to both internal and external groups concerned with the way in which an organization uses its resources to meet its objectives³.

¹ Gregory G. Dess, G. T. Lumpkin, Marilyn L. Taylor, Strategic management – Text and Cases, Mc Graw-Hill, New York, 2004, pp. 8-9.

² Marsel Sulanjaku, Ali Shingjergji, Strategic Cost Management Accounting Instruments and Their Usage In Albania Companies, European Journal of Business, Economics and Accountancy, ALBANIA, Vol. 3, No. 5, 2015, p46.

³ BANGLADESH COST ACCOUNTING STANDARDS BCAS – 23, Strategic Cost Management, <http://www.icmab.org.bd/images/stories/BCAS/BCAS%2023-Strategic.pdf>, p172.

John Shank, an Accounting Professor at Dartmouth College, introduces SCM as; a managerial usage of cost information during one or all the four phases of strategic management cycle. These phases are, strategic formulation, communicating strategies through organization, specifying and using necessary tools to implement strategies, and setting and implementing control techniques to assess degree of success in achieving strategic objectives¹.

Strategic cost management is the use of cost data to develop and identify superior strategies that will produce a sustainable competitive advantage².

(SCM) is cost analysis in a broader context, where the strategic elements become more conscious, explicit and formal. Here, cost data is used to develop superior strategies en route to gaining sustainable competitive advantage..... A sophisticated understanding of a firm's cost structure can go a long way in the search for sustainable competitive advantage. This is strategic cost management³.

Strategic cost management (SCM) is defined as “deliberate decision making aimed at aligning the firm's cost structure with its strategy and optimizing the performance of the strategy”⁴. From the point of view of the researcher, this definition is considered optimal, because it summed up its concept of cost - aligning with the strategy and this what all other definitions about.

In addition to measuring and controlling costs, SCM produce financial and non-financial information at short run and long run as well to add value to customers in order to prevail over competitors and reduce costs at the same considering all stakeholder interests⁵.

Shank, Govindarajan mentioned that SCM combines important aspects of managing costs in value chain. Cooper, Slagmulder argued that SCM is the adoption of cost management methods in the way that they improve strategic position and costs of the company. Hoque argued that SCM provides costly information for strategic decisions. El Kelety concluded that SCM is a philosophy, an attitude and a set of techniques to contribute to shaping the future of the company. Miculescu, defined SCM as a bundle of techniques

¹ Mohamed M. El-Dyasty, A Framework to Accomplish Strategic Cost Management, 2007, <https://ssrn.com/abstract=704201>, p6.

² Don R. Hansen, Maryanne M. Mowen, Op. Cit. p530.

³ PROF. JAWAHAR LAL, Strategic Cost Management, Himalaya Publishing House, Mumbai, 2015, p9.

⁴ Jean-Francois Henri, Olivier Boiral, Marie-Josée Roy, Strategic cost management and performance: The case of environmental costs, Article in The British Accounting Review · March 2015, p3.

⁵ Mohamed M. El-Dyasty, Op. Cit. p4.

and activities used by management in planning and controlling short and long-term decisions, allowing to increase the value of products and to decrease costs¹.

The researcher concluded from the foregoing that SCM is analyze and align the organization's cost structure to suit its strategic objectives in order to improve its competitive position.

Hilton, Maher and Selto² observe that to develop a strategy, managers answer two basic questions: (1) where do we want to go? And (2) how do we want to get there. One cost management role is to provide “financial reality” to the answers to these questions and to the development of a successful strategy by focusing the organization on providing more value at lower cost.

Goal of SCM; Fundamental aim of SCM is to create rational way to make strategic decisions which help to form, communicate, improve and control the strategy, ensuring competitive advantage³.

The term strategic cost management has a broad focus, it is not confined to the continuous reduction of costs and controlling of costs and it is far more concerned with management’s use of cost information for decision-making. SCM is also not confined to use of cost management techniques that reduce costs and improve the strategic position of a firm at the same time. Although, it is often difficult to demean the importance of cost factor for the success of company, but the challenge is to increase revenue, which can be facilitated by SCM. Cost-management knowledge and information is critical to their organization’s success. SCM is important to organizations because it is more than focusing on costs; in the successful companies of the 21st century costs will not be the only most important factor, but also value and revenue will be considered critical factors in the success of companies⁴.

Strategic cost management is a philosophy of improving cost and revenue; strategic cost management is not only cost management but also revenue management, therefore, its objective is seeking to improve productivity, maximize profit, and improve customer satisfaction. This philosophy plays a vital role in determining the future of the company because it promotes the

¹ Darius Gliubicas, Rasa Kanapickiene, Op. Cit. P255.

² PROF. JAWAHAR LAL, Op. Cit. p11.

³ Darius Gliubicas, Rasa Kanapickiene, Op. Cit. p255.

⁴ The Institute of Cost Accountants of India, Op. Cit., p6.21.

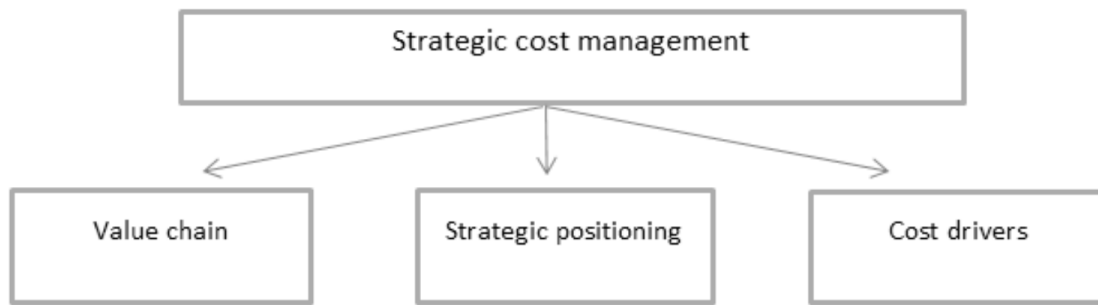
idea of continually finding ways to help organizations make the right decisions to maximize customer value at lower cost¹.

The researcher summarizes that, the availability of accurate information on costs through the application of methods of strategic management of cost leads to reduce costs and thus increase profits and then increase the value of the organization, which leads to increased competitiveness.

4.1.2 Factors Influencing Strategic Cost Management

Strategic cost management has three important pillars, viz., strategic positioning, cost driver analysis and value chain analysis².

Exhibit (4.1.1): Strategic Cost Management pillars



Mario Fernando, Amanda Barbosa, THE IMPORTANCE OF COST MANAGEMENT IN A MANUFACTURING COMPANY OF HYDROELECTRIC PLANTS - A CASE STUDY, Brazilian Journal of Operations & Production Management, VOL. 13, 2016, p 95.

1/ Value chain:

Value is the amount that buyers are willing to pay for the product or service that a firm provides³.

In the SCM framework, managing costs effectively requires a broad focus, external to the firm. Porter has called this focus the value chain. The value chain for any firm in any business is the linked set of value-creating activities all the way from basic raw material sources for component suppliers through to the ultimate end-use product delivered into the final consumers' hands. This focus is external to the firm, seeing each firm in the

¹ Marsel Sulanjaku, Ali Shingjergji, Op. Cit. p46.

² BANGLADESH COST ACCOUNTING STANDARDS BCAS – 23, Op. Cit. p170.

³ John McGee, value chain,2014, <file:///E:/ABC/quationair/SCM/value%20chain.pdf>. P1.

context of the overall chain of value-creating activities of which it is only a part, from basic raw material components to end-use consumers¹.

Value chain is set of activities and resources necessary to create and deliver the product or service valued by customers².

The term value chain describes the connections among various value-adding organizations and functions. The operations management system is the heart of the value chain. Typically, marketing managers and product designers play leadership roles in determining the aspects of value that customer's desire. Operations managers then take the lead in fulfilling those value aspects reliably³.

The value chain is another generic framework that permits a range of applications and analyses. It permits the analyst to divide the firm's activities into broad categories refined into subcomponents and assembly: marketing and sales into market research, product development, sales force, and so on. The usefulness of this is to be able to identify those activities that are the source of the competitive advantage and to be able to locate them within the value chain⁴.

For each of a company's products and services, the following components of the value chain are active⁵:

-Research and Development (R&D) and design activities include the creation of ideas and the development of prototype products, processes, and services.

-Supplies and the activities include the procurement of raw materials and supplies and the activities needed to convert them into finished goods and services.

-Marketing and distribution activities are designed to provide information to potential customers and make the products and services accessible to customers.

-Customer service activities are those resources consumed by supporting the product or service after it is sold to the customer.

¹ The Institute of Cost Accountants of India, Op. Cit., p6.41.

² Jan R. Williams, et al. Financial & Managerial Accounting, Mc Graw Hill, 14th ed. New York, 2008, p 854.

³ Paul Andon, Habib Mahama, Op. Cit., p96.

⁴ John McGee, Op. Cit., p2.

⁵ Jan R. Williams, et al. Op. Cit., p 854.

The value chain provides a useful framework for examining the areas where costs are incurred within a business. The value chain is a set of linked processes or activities that begins with acquiring resources and ends with providing (and supporting) goods and services that customer's value¹.

In order for any organization to most effectively achieve its goals, it is important for its managers to understand the entire value chain in which their organization participates. This understanding can help manager ask, and answer, important questions about their organization's strategy. Should the company concentrate on only a narrow link in the value chain, such as manufacturing and assembly? Or should it expand its operational scope to include securing the raw materials or distributing the final product to end users? Are there opportunities to form beneficial linkages with suppliers, which come earlier in the value chain? Or with customers? These questions involve fundamental, strategic issues about how an organization can best meet its goals. Although many factors affect such decisions, one important factor concerns the costs incurred in creating value in each link in the value chain².

Thus, breaking down the value chain into its strategically relevant activities is basic to successful implementation of cost leadership and differentiation strategies. A value-chain framework is a compelling approach to understanding a firm's strategically important activities. Fundamental to a value-chain framework is the recognition that there exist complex linkages and interrelationships among activities both within and beyond the firm. Two types of linkages must be analyzed and understood: internal linkages and external linkages. Internal linkages are relationships among activities that are performed within a firm's portion of the value chain. External linkages, on the other hand, describe the relationship of a firm's value-chain activities that are performed with its suppliers and customers. External linkages, therefore, are of two types: supplies linkages and customer linkages³.

To exploit a firm's internal and external linkages, we must identify the firm's activities and select those that can be used to produce (or sustain) a competitive advantage. This selection process requires knowledge of the cost and the value of each activity. For strategic analysis, activities are

¹ Langfield-Smith, Management Accounting – information for creating and managing value, Mc Graw Hill, 5th ed, Australia, 2009, p53.

² Ronald W. Hilton, Op. Cit. pp23-24.

³ Don R. Hansen, Maryanne M. Mowen, Op. Cit. p533.

classified as organizational activities and operational activities; the costs of these activities, in turn, are determined by organizational and operational cost drivers¹.

The researcher concludes that, value chain is consist of the activities and resources of the product from the beginning of its design until delivery to the customer and after-sales services, this series part of it is internal and the other is external. A good understanding of this series enables the organization to achieve its objectives by analyzing and understanding the factors influencing it.

- Value-Chain Analysis

Value chain analysis relies on the basic economic principle of advantage - companies are best served by operating in sectors where they have a relative productive advantage compared to their competitors. Simultaneously, companies should ask themselves where they can deliver the best value to their customers².

Value-Chain Analysis is identifying and exploiting internal and external linkages with the objective of strengthening a firm's strategic position. The exploitation of linkages relies on analyzing how costs and other nonfinancial factors vary as different bundles of activities are considered. For example, organizations change their structure and processes as needed to meet new challenges and take advantage of new opportunities. This may include new approaches to differentiation. Additionally, managing organizational and operational cost drivers to create long-term cost reduction outcomes is an important input in value-chain analysis when cost leadership is emphasized. The objective, of course, is to control cost drivers better than competitors can (thus creating a competitive advantage)³.

Porter⁴ classified the full value chain into nine interrelated primary and support activities. Primary activities can be related to actions which the organization performs to satisfy external demands while secondary activities are performed to serve the needs of internal 'customers'. (i) Primary activities are the fundamental activities performed by an organization in order to be operative. They are: (a) Inbound logistics, (b) Operations, (c) Outbound logistics, (d) Marketing and sales and (e) Service. (ii) Secondary

¹ Ibid. p533.

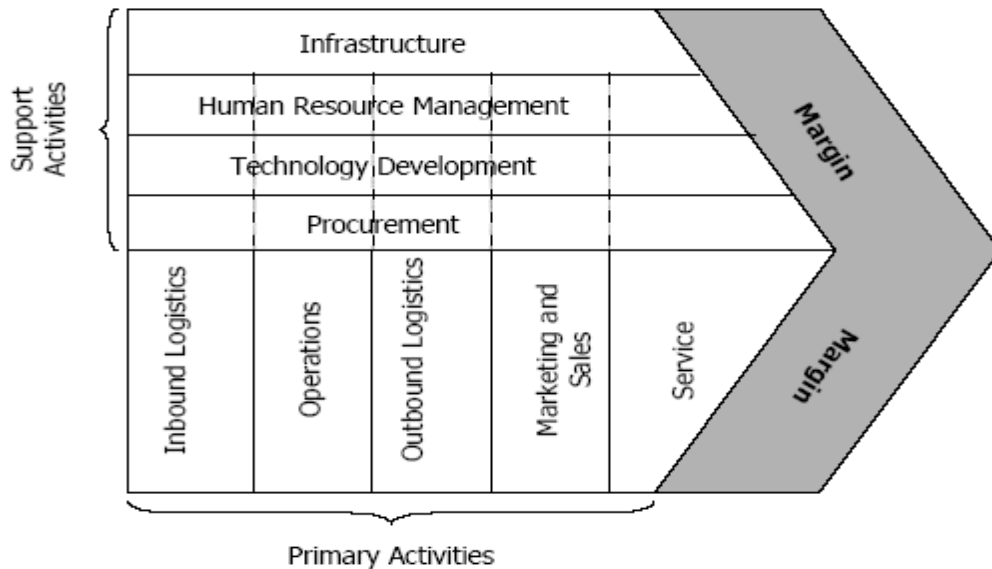
² BANGLADESH COST ACCOUNTING STANDARDS BCAS – 23, Op. Cit. p170.

³ Don R. Hansen, Maryanne M. Mowen, Op. Cit. p536.

⁴ The Institute of Cost Accountants of India, Op. Cit., p 4.51.

activities are support activities, i.e. those activities required to ensure the efficient performance of the primary activities. Support activities are: (a) Infrastructure, (b) Human resources management, (c) Technology development, and (d) Procurement.

Figure (4.1.1) **Porter's value chain model**



Maria Popescu, Value chain analysis in quality management context, Bulletin of the Transilvania University of Braşov, Vol. 4, No. 2, 2011, p 122.

Value-Chain Analysis takes place as a three stage process¹:

- Activity Analysis, where you identify the activities that contribute to the delivery of your product or service.
- Value Analysis, where you identify the things that your customers value in the way you conduct each activity, and then work out the changes that are needed.
- Evaluation and Planning, where you decide what changes to make and plan how you will make them.

An advantage of value chain analysis is that it allows a company to focus on its core competencies. A core competency is the thing that a company does best. It is what gives a company an advantage over its competitors. A common result of value chain analysis is outsourcing, which also be of benefit to a business. Outsourcing is the engagement of other companies to

¹ PRO.SONAL JARIWALA, Value Chain Analysis - Tool of Strategic Cost Management, International Journal for Research in Management and Pharmacy, India, Vol. 4 (2), 2015, p 15.

perform a process or service in the value chain that is not among an organization's core competencies¹.

The researcher sum up what mentioned in the following points:

- The value chain is crucial strategic tool examining the activities of a firm and how they interact with one another to identify the behavior of costs and the areas for differentiation.

- The value chain analysis permits to divide the firm's activities into broad categories, which allowed the organization to be able to identify those activities that are the source of the competitive advantage

- Value chain analysis reveals where a firm's competitive advantages or disadvantages are.

- The value chain provides a useful framework for examining the areas where costs are incurred within a business, which it can help to assess costs in the chain that might be reduced or impacted by a change in one of the chain's processes.

- understanding the entire value chain can help managers in strategic issues about how an organization can best meet its goals.

- **Value- and Non- Value-Added Activities:**

Organization attempt to identify and eliminate the non-value added activities in their value chains. Value added activities add to the product's or service's desirability in the eyes of the consumer. Non-value added activities do not add to the product's desirability. Thus an organization can decrease its cost if a non-value-added activity that consumer's resources can be eliminated without changing the product's desirability².

Managers strive to perform value-adding activities more efficiently and at lower costs consistent with quality and other objectives. The goal with non-value-adding activities is simple: eliminate them. No company has eliminated all non-value-adding activities, but the goal is nonetheless valid. Trying to perform non-value-adding activities more efficiently is a poor tactic because it treats symptoms, not causes. For instance, workers in many companies now inspect for defects as they make products instead of making a separate, final inspection that is a non-value-adding activity. From efforts to eliminate the non-value-adding activities of final inspection and

¹ Susan V. Crosson, Belverd E. Needles, Managerial Accounting, 9th ed, Houghton Mifflin Company, U.S.A, 2008, p 23.

² Jan R. Williams, et al. Financial & Managerial Accounting, Mc Graw Hill, 14th ed. New York, 2008, p 854.

reworking defective units came the emphasis on quality work-doing things right the first time¹.

2/ Cost drivers

Companies are in constant pursuit of management and cost control. This is a primordial factor in competitiveness and in strategic positioning in the market. The strategic cost management should observe, identify and analyze the cost determinants, observe the factors that actually cause the costs, called cost drivers, providing the form that reflects the most precise reality of the situation. This concept is undoubtedly very important for the strategic management of any company, clearly showing that it is necessary to know the factors that cause losses².

Cost driver is an activity or factor that causes costs to be incurred³.

An activity refers to a measure of the organization's output of products or services. The activities that cause costs to be incurred are called cost drivers. A cost driver is a characteristic of an activity or event that causes costs to be incurred by that activity or event⁴.

To manage cost effectively, manager associate costs with activities. Activities that cause costs are cost drivers and include sales, production, and various others such as the number of products the company makes and the number of customers it serves. A group of costs driven by the same activity is a cost pool. A cost pool might consist of all of the costs incurred by a department, such as the assembly department in a factory. A pool also could consist of only some of the costs of a department. For instance, the number of purchase orders drives some costs of the purchasing department and the number of vendors drives others, while four or five other drivers might drive other costs. A pool could also consist of costs from more than one department. The number of employees drives some costs of both the payroll and personnel department⁵.

After identifying a cost driver, managers estimate the fixed and variable components of each cost that is driven by that activity. They use different

¹ Joseph G.Louderback, Jay S. Holmen, Op. Cit. pp78-79.

² Mario Fernando, Amanda Barbosa, THE IMPORTANCE OF COST MANAGEMENT IN A MANUFACTURING COMPANY OF HYDROELECTRIC PLANTS - A CASE STUDY, Brazilian Journal of Operations & Production Management, VOL. 13 No1, 2016, p 95.

³ Paul Andon, Habib Mahama, Op. Cit., p 107.

⁴ Ronald W. Hilton, Op. Cit. p48.

⁵ Joseph G.Louderback, Jay S. Holmen, Op. Cit. p78.

methods. But even if managers fail to estimate successfully how much of a cost is fixed and how much is variable, they can still manage costs better when they know that increasing the number of parts in a product will increase particular costs can make some decision even without knowing how much of each cost is fixed or variable¹.

- Cost driver analysis

Cost Driver Analysis: Examination, quantification, and explanation of the monetary effects of cost drivers associated with an activity².

Cost driver analysis identifies activities that influence the cost and performance of subsequent activities. By reducing or eliminating the event that triggers the first activity in the chain, it may eliminate the need for all subsequent activities. For example, the detection of a defective part requires the part to be reworked or scrapped, the cause of the defect to be corrected, the problem documented, and other related activities. By eliminating the cause—the defective part—the need to perform all subsequent activities are eliminated because they are executed only when a defective part occurs. Costs are thus reduced. By identifying the cost drivers of a business process or an activity, a company can most effectively control costs³.

- Organizational activities and cost drivers:

Organizational activities are of two types: structural and executional. Structural activities are activities that determine the underlying economic structure of the organization. Executional activities are activities that define the processes and capabilities of an organization and thus are directly related to the ability of an organization to execute successfully. Organizational cost drivers are structural and executional factors that determine the long-term cost structure of an organization. Thus there are two types of organizational drivers: structural cost drivers and executional cost drivers⁴.

- Operational activities and cost drivers:

Operational activities are day-to-day activities performed as a result of the structure and processes selected by the organization. Examples include receiving and inspecting incoming parts, moving materials, shipping products, testing new products, servicing products, and setting up equipment. Operational cost drivers (activity drivers) are those factors that

¹ Ibid. p79

² BANGLADESH COST ACCOUNTING STANDARDS BCAS – 23, Op. Cit. p170.

³ PROF. JAWAHAR LAL, Op. Cit. p17.

⁴ Don R. Hansen, Maryanne M. Mowen, Op. Cit. p533.

drive the cost of operational activities. They include such factors as number of parts, number of moves, number of products, number of customer orders, and number of returned products. As should be evident, operational activities and drivers are the focus of activity-based costing¹.

The structural and executional activities define the number and nature of the day-to-day activities performed within the organization. For example, if an organization decides to produce more than one product at a facility, then this structural choice produces a need for scheduling, a product-level activity. Similarly, providing a plant layout defines the nature and extent of the materials handling activity (usually a batch-level activity). Furthermore, although organizational activities define operational activities, analysis of operational activities and drivers can be used to suggest strategic choices of organizational activities and drivers. For example knowing that the number of moves is a measure of consumption of the materials handling activity by individual products may suggest that resource spending can be reduced if the plant layout is redesigned to reduce the number of moves needed. Operational and organizational activities and their associated drivers are strongly interrelated².

- Cost drivers advantages:

The most important advantages of applying contemporary cost driver concepts are the following³:

- Improving enterprise performances.
- Improving employee and manager awareness.
- Controlling costs with better calculations.
- Eliminating costs.
- Actual costs to individual products.

The researcher concludes that cost drivers are the factor whose existence implies cost, also activities that cause costs are cost drivers. The cost factors must be determined and then the fixed and variable parts of it are analyzed. Identifying and analyzing the cost drivers helps the organization focus its efforts on activities that achieve the best results and exclusion that do not add value and improve cost control and better performance.

¹ Ibid. p534.

² Ibid. p535.

³ Gary Cokins, Sorinel Căpușneanu, Cost Drivers- Evolution and Benefits, Theoretical and Applied Economics, Vol. XVII , No. 8, 2010, pp. 15-16.

3/ Strategic positioning

Strategic Positioning: A company's relative position within its industry matters for performance. Strategic positioning reflects choices a company makes about the kind of value it will create and how that value will be created differently than rivals¹.

Strategy is about making a choice as to where the business manager will focus resources and passion. In essence, strategic positioning is the way the business goes to market – the way the business creates value for the customer. The strategic positioning choice drives the firm's resource investment decisions, including how management allocates time and energy. The choice of strategic position is built around the firm's core competencies – the primary skills and sources of competitive advantage – and the opportunities and threats that the market and external environment provide².

Strategic positioning is the key to creating and sustaining a competitive advantage. Competitive advantage is creating better customer value for the same or lower cost than offered by competitors or creating equivalent value for lower cost than offered by competitors. Customer value is the difference between what a customer receives (customer realization) and what the customer gives up (customer sacrifice). What a customer receives is more than simply the basic level of performance provided by a product. What is received is called the total product. The total product is the complete range of tangible and intangible benefits that a customer receives from a purchased product. Thus, customer realization includes basic and special product features, service, quality, instructions for use, reputation, brand name, and any other factors deemed important by customers. Customer sacrifice includes the cost of purchasing the product, the time and effort spent acquiring and learning to use the product, and post-purchase costs, which are the cost of using, maintaining, and disposing of the product³.

The dilemma of being both focused and flexible in strategic positioning can be best managed or resolved by delineating and clarifying the responsibilities of different members of the leadership and management team. The operations managers who are responsible for implementing the chosen strategy should emphasize the activities that will result in the firm being “Best in Class” in implementing that strategy - - they must stay focused. The senior management (and Board) in contrast is primarily

¹ BANGLADESH COST ACCOUNTING STANDARDS BCAS – 23, Op. Cit. p170.

² The Institute of Cost Accountants of India, Op. Cit., p3.1.

³ Don R. Hansen, Maryanne M. Mowen, Op. Cit. p530.

responsible for choosing the proper strategy and adapting that strategy to the changing business climate and market place; they are responsible to regularly scan the environment and position the business to be sufficiently flexible to adapt to changes that are likely to occur¹.

For strategic analysis, volume is usually not the most useful way to explain cost behavior. In a strategic sense, it is more useful to explain cost position in terms of the structural choices about executional skills that shape the firm's competitive position².

It follows from the above that strategic positioning is the basis of competitive advantage which means to do something different from your competitor that add value through your available capabilities taking into consideration threats and opportunities available in the market.

- Principles of Strategic Positioning:

To establish and maintain a distinctive strategic positioning, a company needs to follow six fundamental principles³:

First, it must start with the right goal: superior long-term return on investment. Only by grounding strategy in sustained profitability will real economic value be generated.

Second, a company's strategy must enable it to deliver a value proposition, or set of benefits, different from those that competitors offer.

Third, strategy needs to be reflected in a distinctive value chain. To establish a sustainable competitive advantage, a company must perform different activities than rivals or perform similar activities in different ways.

Fourth, robust strategies involve trade-offs. A company must abandon or forgo some product features, services, or activities in order to be unique at others.

Fifth, strategy defines how all the elements of what a company does fit together, a strategy involves making choices throughout the value chain that are interdependent; all a company's activities must be mutually reinforcing.

Finally, a strategy involves continuity of direction. A company must define a distinctive value proposition that it will stand for, even if that means forgoing certain opportunities.

¹ Michael Boehlje, STRATEGIC POSITIONING: FOCUS VS. FLEXIBILITY, Purdue Agriculture, June 01, 2015, https://ag.purdue.edu/commercialag/Documents/Resources/Mangement-Strategy/Strategic-Management/2015_06_01_Boehlje_Strategic_Positioning_Focus.pdf.

² BANGLADESH COST ACCOUNTING STANDARDS BCAS – 23, Op. Cit. p172.

³ The Institute of Cost Accountants of India, Op. Cit. p3.21.

Strategic positioning is the process of selecting the optimal mix of three general strategic approaches. The mix is selected with the objective of creating a sustainable competitive advantage. Increasing customer value to achieve a competitive advantage is tied closely to judicious strategy selection. These three general strategies are; cost leadership, product differentiation, and focusing.

A/ Cost leadership:

According to Porter, when a firm sustains profits that exceed the average for its industry, the firm is said to possess a competitive advantage over its rivals. The goal of much of business strategy is to achieve a sustainable competitive advantage, which can be achieved through cost advantage. Cost leadership strategy is usually developed around organization-wide efficiency, therefore for firms implementing the cost leadership strategy to maintain a strong competitive position and sustain their profit margin for a considerable period of time; they have to place a premium on efficiency of operations in all functional areas¹.

The objective of cost leadership strategy is to provide the same or better value to customer at a lower cost than offered by competitors. Essentially, if customer value is defined as the difference between realization and sacrifice, a low-cost strategy increases customer value by minimizing customer sacrifice. In this case, cost leadership is the goal of the organization².

Attaining cost leadership typically requires aggressive construction of efficient scale facilities and vigorous pursuit of cost reductions through experience, tight cost and overhead control, avoidance of marginal customer accounts, and cost minimization in areas like R&D, service, sales force, advertising, etc. When attempting to achieve an overall cost leadership position, low cost relative to competitors is the theme running through the entire strategy³.

To understand how overall cost leadership strategy may generate superior profitability, it is necessary to identify the benefits of a low-cost position. As suggested by Porter “[a low-cost position] gives a firm a defense against rivalry from competitors, because its lower costs mean that it can still earn

¹ SEBASTIAN MUTISO MUASA, COST LEADERSHIP STRATEGY AND SUSTAINABLE COMPETITIVE ADVANTAGE OF NAIVAS SUPERMARKET LIMITED, UNIVERSITY OF NAIROBI, KENYA , 2014,p

² Don R. Hansen, Maryanne M. Mowen, Op. Cit.p531.

³ Martina Minarik, Cost Leadership & Differentiation - An investigation of the fundamental trade-off between Porter's cost leadership and differentiation strategies, M.Sc. Thesis in International Business, Stockholm School of Economics, Institute of International Business, 2007, pp. 13-14.

returns after its competitors have competed away their profits through rivalry. A low-cost position defends the firm against powerful buyers because buyers can exert power only to drive down prices to the level of the next most efficient competitor. Low cost provides a defense against powerful suppliers by providing more flexibility to cope with input cost increases. The factors that lead to a low-cost position usually also provide substantial entry barriers in terms of scale economies or cost advantages¹.

- Risk of cost leadership- Positioning a firm as a low cost manufacturer or service provider places a severe burden on the firm. Cost leadership is vulnerable to risks such as: 1/ Technological change that erases past investments and outdates past learning, 2/ Risk of imitation by late entrants who have advantage of low cost learning, 3/ Lack of attention to the needs and preferences of customer due to excessive concerns for cost minimization, 4/ Unexpected inflation in costs that reduces the firm's ability to offset product differentiation through cost leadership².

The researcher considers that the cost leadership strategy is one of the most important strategies that put the company in a strong competitive position, but it requires a great effort to understand the cost and cost structure of the company as a whole without neglecting one aspect of the cost, and the difficulty in continuing this strategy and maintain

B/ Differentiation:

Differentiation is aimed at the broad market that involves the creation of a product or services that is perceived throughout its industry as unique. The company or business unit may then charge a premium for its product. This specialty can be associated with design, brand image, technology, features, dealers, network, or customer's service. Differentiation is a viable strategy for earning above average returns in a specific business because the resulting brand loyalty lowers customers' sensitivity to price. Increased costs can usually be passed on to the buyers. Buyer's loyalty can also serve as entry barrier-new firms must develop their own distinctive competence to differentiate their products in some way in order to compete successfully³.

A differentiation strategy, on the other hand, strives to increase customer value by increasing what the customer receives. A competitive advantage is

¹ Martina Minarik, Op. Cit.p 14.

² Ritika Tanwar, Porter's Generic Competitive Strategies, IOSR Journal of Business and Management, Volume 15 (1), 2013, Delhi University, p 17.

³ Ritika Tanwar, Op. Cit.p 13.

created by providing something to customers that is not provided by competitors. This differentiation can occur by adjusting the product so that it is different from the norm or by promoting some of the product's tangible or intangible attributes. Differences can be functional, aesthetic, or stylistic. To be of value, however, customer must see the variation as important. Furthermore, the value added to the customer by differentiation must exceed the firm's costs of providing the differentiation. If customer see the variation as important and if the value added to the customer exceeds the costs of providing the differentiation, then a competitive advantage has been established¹.

As for overall cost leadership, successful differentiation requires that the strategy be rare and costly to imitate. And rare and costly bases for differentiation are sources of sustainable competitive advantage. As Barney & Hesterley mentioned "the rarity of a differentiation strategy depends on the ability of individual firms to be creative in finding new ways to differentiate their products." In short, creative firms will always manage to differentiate themselves from competitors. As rivals try to imitate these firms' last differentiation move, creative firm will already be working on new moves and therefore they always remain one step ahead of competition. In general, bases for differentiation that are costly to duplicate include links between functions, timing, location, reputation, distribution channels, and service and support. Product mix, links with other firms, product customization, product complexity and consumer marketing may be costly to imitate depending on the circumstances².

Risk of differentiation – A differentiation strategy is vulnerable to the following risks: Increased cost differential between low cost producers and the differentiating firm will motivate brand loyalty customers to switch brands. Thus, buyers would sacrifice some additional features and image for huge savings in cost. Imitation might narrow down the perceived difference. If a differentiating firm lags behind too much, a low cost firm may take over the market of the differentiating firm³.

The researcher conclude that the implementation of this strategy requires the adoption of the company on the skills and competencies difficult to imitate and must be excellence on a number of levels to be a more successful and viable strategy, but they need less sensitive customers towards prices.

¹ Don R. Hansen, Maryanne M. Mowen, Op. Cit.p531.

² Martina Minarik, Op. Cit.p 18.

³ Ritika Tanwar, Op. Cit.p 17.

C/ Focusing:

A focusing strategy is selecting or emphasizing a market or customer segment in which to compete. One possibility is to select the markets and customers that appear attractive and then develop the capabilities to serve these targeted segments. Another possibility is to select specific segments where the firm's core competencies in the segments are superior to those of competitors. A focusing strategy recognizes that not all segments are the same. Given the capabilities and potential capabilities of the organization, some segments are more attractive than others¹.

It is hoped that by focusing your marketing efforts on one or two narrow market segments and tailoring your marketing mix to these specialized markets, you can better meet the needs of that target market. The firm typically looks to gain a competitive advantage through effectiveness rather than efficiency. It is most suitable for relatively small firms but can be used by any company. As a focus strategy it may be used to select targets that are less vulnerable to substitutes or where a competition is weakest to earn above-average return on investment².

If a firm can achieve sustainable cost leadership (cost focus) or differentiation (differentiation focus) in its segment and the segment is structurally attractive, then the focuser will be an above-average performer in its industry. Segment structural attractiveness is a necessary condition because some segments in an industry are much less profitable than others. There is often room for several sustainable focus strategies in an industry, provided that focusers choose different target segments. Most industries have a variety of segments, and each one that involves a different buyer need or a different optimal production or delivery system is a candidate for a focus strategy³.

Risk of focus-A focus strategy is vulnerable to the following risks: Increasing cost differentiated between broad-range competitors and the focus firm might offset the differentiation achieved through focus and turn the customers towards firms that offer a broad range of products. Perceived or actual differences between products and services might disappear. Other

¹ Don R. Hansen, Maryanne M. Mowen, Op. Cit.p531.

² Ritika Tanwar, Op. Cit.p 14.

³ Michael E. Porter, COMPETITIVE ADVANTAGE- Creating and Sustaining Superior Performance, THE FREE PRESS, NEW YORK, 1985, p 16.

firms might find submarkets within the target market of the focus firm and out focus the focuser¹.

This strategy can be applied either at the level of differentiation or at the lower cost level or both. Therefore, if the organization chooses the level of excellence, it will face the risks of excellence. If it chooses the cost level, it will face the cost risk.

4.1.3 Cost Management

Cost management is the improvement of an organization's cost effectiveness through understanding and managing the real causes of costs. Although the predominant focus is on costs, most contemporary approaches to cost management also focus on improving other aspects of performance, such as quality and delivery².

Cost management has a much broader focus than that found in traditional costing systems. It is not only concerned with how much something costs but also with the factors that drive costs, such as cycle time, quality, and process productivity. Thus, cost management requires a deep understanding of a firm's cost structure. Managers must be able to determine the long- and short-run costs of activities and processes as well as the costs of goods, services, customers, suppliers, and other objects of interest³.

The essence of cost management is to utilize a group of tools to generate information regarding planning, decision making, and control at both short run and long run in order to help organization's management to create products or provide services with more effective and efficient way comparing with competitors⁴.

It proceeds from the foregoing that, cost management is the use of methods and tools that provide accurate information on the organization's cost structure helps management to continuously improve cost and improve the efficiency of the organization's performance.

Managing costs has two basic aspects: One is managing the cost itself-for instance, buying materials, parts, and components at better prices. This aspect has traditionally been the principal focus of managerial accounting. The second, and usually more important, aspect is managing the activity that causes the costs-for instance, reducing the material content of a product

¹ Ritika Tanwar, Op. Cit.p 17.

² Paul Andon, Habib Mahama, Management Accounting for Change, Mc Graw Hill, Australia, 2005, p226.

³ Don R. Hansen, Maryanne M. Mowen, Op. Cit. p2.

⁴ Mohamed M. El-Dyasty, Op. Cit. p1.

without sacrificing quality. Managers now pay much more attention to this latter aspect¹.

There are four objectives in cost management²:

- Spending timely—Ensure that money or resources are expended in accordance with the project or corporate capital expenditure plan;
- Spending wisely—Ensure that monies are well-spent, i.e. that a planned unit of gain is achieved for each unit of expenditure;
- Spending correctly—Ensure expenditures only for those things for which we are obligated;
- Spending perceptively—Ensure that spending versus achievement variances are identified, analyzed, corrected or trended so that early warnings can enable timely actions.

Successful cost management primarily requires the precise cost measurement. It is often repeated in business circles the following sentence: “That which cannot be measured, cannot be controlled”. For the measurement of costs it is competent the cost accounting, which uses different techniques or cost accounting systems in the long period of time. Conventional cost accounting, which includes a system of calculation based on the actual costs, the system of standard costing and accounting system of the standard variable costs, had its untouchable place and importance in conditions where the human labor has dominated in the production process in relation to the mechanical work, i.e. when labor costs had a significant share in the total cost structure. Although this approach is suitable for the purposes of external financial reporting, information obtained on the basis of traditional costing systems are not suitable for managing the challenges faced by modern enterprises³.

Through proper identification and measurement of costs, an enterprise will be able to manage the costs. Effective cost management is a source of the superior competitive advantage of an enterprise⁴.

- Cost Management System

A cost management system consists of a set of formal methods developed for planning and controlling an organization’s cost-generating activities relative to its goals and objectives¹.

¹ Joseph G.Louderback, Jay S. Holmen, *Managerial Accounting*, 10th ed. Thomson, U.S.A, 2003, p78.

² Robert L. Tichacek, *Effective Cost Management—Back to Basics*, AACE International Transactions, 49th AACE International Annual Meeting, New Orleans, LA, USA, June 26-29, 2005, p11-2.

³ Bojan Savić, Zorica Vasiljević, Dragan Đorđević, *STRATEGIC COST MANAGEMENT AS INSTRUMENT FOR IMPROVING COMPETITIVENESS OF AGRIBUSINESS COMPLEX*, Economics of Agriculture, University of Belgrade, Faculty of Agriculture, 2014, vol. 4, p1006.

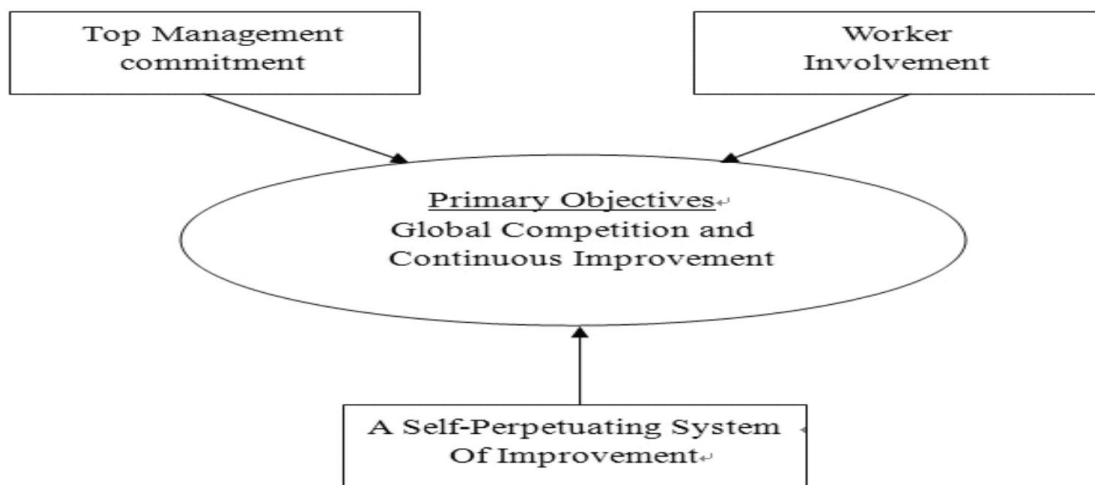
⁴ *Ibid*, P1006.

The main purpose of the cost management system is to maximize profits. In order to maximize profits, the company has to face and succeed competitions that come from either domestic or international companies, and to develop themselves continually. In a nutshell, the two primary objectives to provide a cost management system are global competition and continuous improvement².

A cost management system is a management planning and control system with the following objectives³:

- To measure the cost of the resource consumed in performing the organization's significant activities.
- To identify and eliminate non-value-added costs. These are the costs of activities that can be eliminated with no deterioration of product quality, performance, or perceived value.
- To determine the efficiency and effectiveness of all major activities performed in the enterprise.
- To identify and evaluate new activities that can improve the future performance of the organization.

Exhibit (4.1. 3): Cost Management Systems



Hailiang Huang, Chaofeng Zhang, Cost Management--A case study of a gardening firm project, Master, thesis in Industrial engineering and management, University of Gävle, 2013, p12.

¹ Jesse T. Barfield, Cecily A. Raiborn, Michael R. Kinney, cost accounting traditions and innovations, West Publishing Company, U.S.A. 1998, p677.

² Hailiang Huang, Chaofeng Zhang, Cost Management--A case study of a gardening firm project, Master, thesis in Industrial engineering and management, University of Gävle, Faculty of Engineering and Sustainable Development, Department of Industrial Development, IT and Land Management, 2013, p12.

³ Ronald W. Hilton, Managerial Accounting – Creating Value in a Dynamic Business Environment, Mc Graw-Hill, 5th ed, U.S.A. 2002, p22.

As illustrated in exhibit (4,1,3), a cost management system requires support and commitment from senior management, the worker involved in different positions, and a self-perpetuating system of improvement, these three requirements lead the company to global competition and continuous improvement.

4.1.4 Traditional Cost Management versus Strategic Cost Management

The following table shows the difference between traditional cost management strategic cost management:

Table (4.1.1): Traditional Cost Management VS. Strategic Cost Management

Traditional Cost Management	Strategic Cost Management
1. Standard cost system with normal allowance for scrap, waste, rework; zero defect standard is not practical	1. No allowance for scrap, waste, rework; zero defect is the concept
2. Overhead variance analysis; maximize production volume (not quality) to absorb overhead	2. Overhead absorption is not the key; standard costs and variance analysis are deemphasized, in general
3. Variance analysis on raw material price; procurement from multiple suppliers to avoid unfavorable price variance; low price/low-quality raw materials	3. No control on raw material price; certify vendors who can deliver right quantity, right quality, and on time.
4. No emphasis on nonfinancial performance measures	4. Heavy use of nonfinancial measures (parts-per-million defects, percentage yields, scrap, unscheduled machine down times, first-pass yields, number of employee suggestions)
5. No tracking of customer acceptance	5. Systematic tracking of customer acceptance (customer complaints, order lead time, on-time delivery, incidence of failures in customers' locations)
6. No cost of quality analysis	6. Quality costing as a diagnostic and management control tool
CONTROL PHILOSOPHY	
1. The goal is to be in the top tier of the reference group	1. The goal is kaizen
2. The annual target is to meet the	2. Industry norms set the floor

standards	
3. Standards are to be met, not exceeded	3. The annual target is to beat last year's performance
4. Standards are tough but attainable	4. Try to beat this year's target (continual improvements)
5. A regularly exceeded standard is not tough enough	5. Each achievement level sets a new floor for future achievement

Source: PROF. JAWAHAR LAL, Strategic Cost Management, Himalaya Publishing House, Mumbai, 2015, p12.

In general the researcher concludes from the above table that the main difference between Strategic Cost Management and Traditional Cost Management, that SCM is not just focus on managing and improving cost, but also revenue management, so, its objective is seeking to improve productivity, maximize profit, and improve customer satisfaction. The main idea of SCM is continuous improvement. Primary concern of SCM is competitive advantage, taking in consideration the external factors, while TCM focuses only on the internal factors. SCM analyzes using quantitative data, and qualitative data, providing long-term strategic insights, while TCM is not emphasis on quantitative data. While TCM is limited to cost control, SCM seeking for cost reduction.

Below we review the concept of both Cost Control and Cost Reduction:

4.1.5 Cost Control, Cost Reduction

Cost control denotes executive action by given members of an undertaking to maintain the costs within budget and/ or standards established. The Terminology of CIMA defines cost control as follows¹:

Cost control is the regulation by executive action of the costs of operating an undertaking particularly where such action is guided by cost accounting. It requires close monitoring and management has to take corrective action on time. The evaluation of performance is done by benchmarking against budgets and/ or standards set. Cost control is a continuous process in business enterprises.

Cost control is concerned with an element of marginal cost which involves the determination of unit cost, measurement and correction of the performance of subordinates to make sure that the objective of the

¹ Manash Dutta, Cost Accounting – Principles and Practice, Pearson Education Inc, Singapore, 4th ed. 2016, p22-1.

enterprises and the means to obtain them are accomplished effectively and economically. Cost control is the regulation of cost of operating a business and is concerned with keeping costs within acceptable limits. These will usually be specified as a standard cost or target cost limits in formal operational plan¹.

The advantages of cost control are as follows²:

- (a) It helps in utilizing the resources to the full extent.
- (b) It helps in reduction of prices which are benefited by customers.
- (c) It helps in competing successfully in the market.
- (d) It increases the profit earning capacity of the business.
- (e) It increases the goodwill of the business.

The Researcher considers cost control is the measurement and follow-up cost to ensure compliance with the goals set, which helps with the assessment and evaluation.

Cost reduction is a systemic effort to improve profit margins by eliminating all forms of waste and unnecessary expense without, at the same time, impairing the generation of revenue. The Terminology of CIMA defines cost reduction as follows: “Cost reduction is to be understood as the achievement of real and permanent reduction in the unit cost of goods manufactured or services rendered without impairing their suitability for the use intended”³.

The above definition brings out the following features of cost reduction⁴ :

- 1/ Reduction in unit costs: the aim of cost reduction is to bring down the cost per unit of a commodity or service.
- 2/ Reduction to be permanent: reduction in unit cost should not only be real but permanent also.
- 3/ Use value to be unaffected: any article, produced with the available scarce resources has not only exchange value but use value also.

Bruce defined that cost reduction is the application of procedures to monitor expenditures and performance against progress of a project and manufacturing operations with projected completion to measure variances

¹ Lawal Babatunde Akeem, Op. Cit. p21.

² OLAGUNJU Adebayo, IMEOKPARIA Lawrence, Budgetary Control: A Tool for Cost Control in Manufacturing Companies in Nigeria, European Journal of Business and Management, Nigeria, Vol.6, No.37, 2014, p99.

³ Manash Dutta, Cost Accounting – Principles and Practice, Pearson Education Inc, Singapore, 4th ed. 2016, p22-2.

⁴ S.P. IYENGAR, Cost Accounting Principles & Practice, sultan chand & sons, New Delhi, ninth edition,2002, p h-4.3.

from authorized budgets and allow effective action to be taken to achieve minimal costs¹.

Researcher believes that cost reduction is the use of techniques that enable the transition from a cost level to a lower level without affecting the quality.

- Benefits of cost reduction

The benefit accruing from cost reduction may be summarized as under²:

1/ The concern adopting a cost reduction plan successful, becomes more profitable. It thus occupies an enviable position in the industry.

2/ Higher taxable capacity of undertaking results in increased revenue to the government.

3/ The under taking will have capacity to build up reserves and thereby enjoys financial stability during a period of business adversity.

4/ The concern will have the capacity of financial expansion or modernization program.

5/ Goodwill can easily be built up.

6/ Increased competitive strength of the industry may stimulate exports.

7/ Incentive to other undertakings to adopt similar cost reduction program.

8/ Higher dividends to shareholders and reasonable prices and good quality products to consumers.

Cost reduction is closely related to cost control. In fact, cost control and cost reduction are considered to be the two aspects of the same problem, viz., cost improvement. Even according to Dobson, “reduction of expenditure contributes to cost improvement.” But yet, cost control differs from cost reduction in many respects³.

Initially, the difference between cost reduction and cost control should be given attention. Cost reduction is an unstoppable process of critical cost examination, analysis and challenge of standards. Mersereau pointed out that cost reduction exists everywhere in the business, in other words, productions, processes, manufacture, methods, organization and staff should be considered. Moreover, cost reduction is critically examined and reviewed

¹ Xu Zhiran, Zhou Mengxiao, Cost Reduction in the Automobile Industry Case Studies of the Chinese market, University of Halmstad, Master's Programme, Sweden, 2012, p7.

² S.P. IYENGAR, Op. Cit. pp. h-4.6- h-4.7.

³ S.P. IYENGAR, Op. Cit. p h-4.3.

with a view to improving efficiency and effectiveness and reducing the costs¹.

- Cost Control versus Cost Reduction

Table (4.1.2): Cost Control versus Cost Reduction

Cost Control	Cost Reduction
1. Cost control process involves: (a) setting targets and standards, (b) ascertaining actual performance, (c) Comparing actual performance with targets, (d) investigating the variances, and (e) taking corrective action. In cost control, standards form benchmarks for evaluating actual performance.	1. Cost reduction is not concerned with setting targets and standards and maintaining performance according to standards. It involves critical examination of the various products, processes, methods, etc., with a view to reduce costs and improve efficiency and effectiveness.
2. It aims at adherence to and achieving standards, that is, cost targets. It assumes existence of standards and these standards are not challenged over the period.	2. It aims at real and permanent reduction in costs. Thus it aims at improving the standards. It challenges standards and assumes existence of concealed potential savings in the standards.
3. It lacks a dynamic approach as the only objective is not to exceed the standards.	3. It is continuous, dynamic and innovative in nature, looking always for measures and alternative to reduce costs.
4. It is a preventive function.	4. It is a never-ending corrective function.
5. In cost control, costs are optimized before they are incurred. Being a routine exercise it is operation- oriented.	5. In cost reduction, there is always assumed a scope for reducing the incurred costs under controlled conditions. It is research oriented, always trying to reduce costs through planned research.
6. It is generally applicable to items which have standards.	6. This is applicable to every activity of the business.
7. It contains guidelines and directive of management as to how	7. It adds thinking and analysis to action at all levels of management.

¹ Xu Zhiran, Zhou Mengxiao, Op. Cit. p7.

to do a thing.	
8. It requires close monitoring and timely corrective actions.	8. It demands creativity.
9. Budgetary control and standard costing are important tools of cost control.	9. It uses techniques like value engineering, value analysis, work study, operation research, ABC analysis, simplification and standardization, etc.

Source: PROF. JAWAHAR LAL, Strategic Cost Management, Himalaya Publishing House, Mumbai, 2015, p6.

In summary, strategic cost management seeks to achieve cost to the minimum possible, taking into account the analysis of elements of the internal and external environment in order to meet customer needs. It is interested in strengthening the competitive position of the organization in order to reach the best strategies that help to achieve competitive advantages to ensure survival and continuity under the conditions of environmental change requires constant improvement.

This section reviewed the concept of strategic cost management, showed the three pillars of it; value chain, cost driver, strategic positioning, and represent traditional cost management and the different between it and strategic cost management, at the end presented cost control and cost management and the difference between them.

Section Two

Strategic Cost Management Techniques

4.1.0 Introduction

This section concerns Strategic Cost Management Techniques, reviewing the concept Life-cycle cost management, Target costing, Activity Based Costing, Activity Based Management, Just-in-Time System, Balanced Scorecard, Benchmarking, Kaizen Costing, and The Theory of Constraints.

Strategic Cost Analysis explains the tools that managers need. It examines the different methods of calculating cost, techniques for controlling and monitoring costs, and ways to integrate cost data and strategy into every aspect of the organization. Understand the various cost optimization and profit-enhancing tools and techniques it helps companies identify, analyze and use strategically important resources for continuing success. This section explains the methods and techniques of strategic cost management that can be applied strategically at any level in an organization. The manager will find that the cost information provided will help them plan and control and also make strategic decisions in the most effective way.

4.2.1 Life-cycle cost management

Strategic cost management emphasizes the importance of an external focus and the need to recognize and exploit both internal and external linkages. Life-cycle cost management is a related approach that builds a conceptual framework which facilitates management ability to exploit internal and external linkages¹.

Life Cycle Costing (LCC hereafter) was first used in the United States by the Department of Defense (US DoD) in the mid-1960s. The US DoD applied LCC in the procurement of military equipment, as they found that acquisition costs only accounted for a small part of the total cost for the weapons systems while operation and support costs comprised as much as 75%. Since then, many different backgrounds and disciplines have been interested in calculating the optimal allocation of budget by estimating the costs that incur during the whole life cycle of a product, service, project, investment, etc. All the different fields, scopes and aims behind LCC have laid to a large number of different LCC definitions².

¹ Don R. Hansen, Maryanne M. Mowen, Op. Cit. p544.

² Helena Estevan, Bettina Schaefer, Life Cycle Costing State of the art report, Local Governments for Sustainability, European Secretariat, 2017, <http://www.sppregions.eu>, p4.

Life cycle costing is a technique of “costing” and includes a set of cost evaluation of procedures and production techniques that considers all the lifecycle of the products from its design and manufacturing till the end life or the abandonment of the products, which has in focus the determination of the most optimal cost¹.

As described in the new EU directive², life-cycle-costs entail all costs born during the life-cycle of products, services or works. They comprise e.g. costs related to research and development activities, costs related to acquisition activities, costs of use, such as costs born through maintenance, repair and overhaul activities and end of life costs, such as costs for disposal or removal. Systematically summarizes these costs in five categories: (1) costs incurred through initial acquisition (including potential research and development efforts), (2) costs incurred through reception of products, services and works, (3) costs incurred through possession, (4) costs incurred through utilization and (5) costs incurred through elimination.

Cost reduction, not cost control, is the emphasis of life-cycle cost management. Cost reduction strategies should explicitly recognize that actions taken in the early stages of the production life cycle can lower costs for later production and consumption stages. Since 90% or more of a product’s life-cycle costs are determine during the development stage, it makes sense to emphasize management of activities during this phase of a product’s existence³.

Product design and process design afford multiple opportunities for cost reduction by designing to reduce: (1) manufacturing costs, (2) logistical support costs, and (3) post-purchase costs, which include customer time involved in maintenance, repair, and disposal. For these approaches to be successful, managers of producing companies must have a good understanding of activities and cost drivers and know how the activities interact. Manufacturing, logistical, and post-purchase activities are not independent. Some designs may reduce post-purchase costs and increase manufacturing costs. Others may simultaneously reduce production, logistic, and post-purchase costs⁴.

¹ Marsel Sulanjaku, Ali Shingjergji, Op. Cit. p47.

² Von Deimling et al., Life-Cycle-Cost-Management as an Instrument for Strategic Public Procurement: State of the Art and Perspectives, 25th Annual IPSERA Conference, Dortmund, Germany, 2016, p2.

³ Don R. Hansen, Maryanne M. Mowen, Op. Cit. p548.

⁴ Ibid, p548.

There are four principal lessons to be learned from lifecycle costing¹:

- All costs should be taken into account when working out the cost of a unit and its profitability.
- Attention to all costs will help to reduce the cost per unit and will help an organization achieve its target cost.
- Many costs will be linked. For example, more attention to design can reduce manufacturing and warranty costs. More attention to training can reduce machine maintenance costs. More attention to waste disposal during manufacturing can reduce end-of life costs.
- Costs are committed and incurred at very different times. A committed cost is a cost that will be incurred in the future because of decisions that have already been made. Costs are incurred only when a resource is used.

The life cycle budget provides useful information for managing and reducing costs. For example, it can be used to carefully plan capacity requirements. More importantly, major cost savings can be achieved by recognizing the trade-off between costs incurred prior to production and costs incurred once production begins².

The researcher concludes that this technology takes into account and study all the costs generated during the product lifecycle, it gives a comprehensive picture of cost, wisdom lies in paying attention to cost from the beginning of occurrence and that's what leads the enterprise to successfully reduce and manage costs.

4.2.2 Target costing:

Target costing is a system for profit planning and cost management. The required features and performance of the proposed product must be produced, to generate the firm's desired level of profit, given the product's anticipated selling price³.

The Target costs are defined as the difference between the anticipated price and the required return. In practice, target profit often is driven by medium term corporate profit plans, which reflect the returns demanded by the financial markets. This method is simple to apply in circumstances where

¹ The Institute of Cost Accountants of India, Op. Cit. p6.11.

² Langfield-Smith, Thorne Hilton, Management Accounting: information for creating and managing value, 5th ed., McGraw Hill, Australia, 2009, p 805.

³ Langfield-Smith, Thorne Hilton, Op. Cit., p 807.

prices are determined in advance or when they can be determined based on the products of other enterprises in the branch¹.

Target costing is a systematic process of cost management and profit planning, which has six key principles²: (1) Price led costing. (2) Focus on customers. (3) Focus on design. (4) Cross-functional involvement. (5) Value-chain involvement. (6) Life-cycle orientation.

Target cost is the maximum amount of cost that can be incurred on a product and with it the firm can still earn the required profit margin from that product at a particular selling price. The estimated cost is calculated by subtracting a desired profit margin from an estimated (or market- based) price to arrive at a desired production, engineering, or market cost. The product is then designed to meet that cost³.

Life-cycle cost management emphasizes cost reduction, not cost control. Target costing becomes a particularly useful tool for establishing cost reduction goals during the design stage. A target cost is the difference between the sales prices needed to capture a predetermined market share and the desired per-unit profit. The sales price reflects the product specifications or functions valued by the customer (referred to as product functionality). If the target cost is less than what is currently achievable, then management must find cost reductions that move the actual cost toward the target cost. Finding those cost reductions is the principle challenge of target costing⁴.

The cost management solution provides a framework with the functions required for the business processes used in target costing. The target costing activity management function enables real time sharing of information about things like activity progress and the achievement of target costs. The plan conceptualization stage support function enables a cost evaluation to be conducted prior to starting design by breaking down the target costs based on functional blocks and other units that make up the product and utilizing data on similar components to calculate the product cost. The development stage support function calculates a cost estimate by specifying areas for improvement in functional blocks, units, and individual parts and materials together with the schedule for when the improvements are to be made, their difficulty, and adding up the financial benefits. It also provides functions for

¹ Bojan Savić, Zorica Vasiljević, Dragan Đorđević, Op. Cit. p 1011.

² Gholam Syedain Khan, TARGET COSTING AND COMPETITIVE ADVANTAGE – AN INDIAN PERSPECTIVE, THE MANAGEMENT ACCOUNTANT, 2014, www.icmai.in, p76.

³ Marsel Sulanjaku, Ali Shingjergji, Op. Cit. p48.

⁴ Don R. Hansen, Maryanne M. Mowen, Op. Cit. p550.

global design and production that include multi-currency data entry, automatic conversion to the master currency, and exchange rate simulation¹.

- Stages of Target Costing²:

- 1) Identifying the wanted product and its characteristics.
- 2) Establishing target price.
- 3) Determining target profit.
- 4) Determining target cost.
- 5) Target costing decomposition.
- 6) Recovering the cost difference.
- 7) Continuous improvement.

Target costing supports activities aimed at achieving the target cost specified by product profit planning, and provide cost estimates as feedback for product profit planning. Target costing is something that many companies have conventionally performed as part of activities aimed at achieving a particular manufacturing cost during the planning and development stages. However, in addition to problems such as the fact that cost improvement know-how varies from person to person, which prevents organizations from making use of empirical values; costing calculations taking up time that could have been spent working on improvements; and the inability to link the results of activities straight back to product profit planning; there are also difficulties associated with a global era, including demand fluctuations, local production, variations in material costs, and exchange rate fluctuations³.

It is clear to the researcher from the above that the application of the concept of cost target leads to the reorganization of the company's activities at all levels, starting from design until the end of the product, leading to the optimal utilization of resources and reduce the cost and increase the competitiveness of the company.

4.2.3 Activity Based Costing

Activity-Based Costing is developed from the traditional cost system to improve the accuracy of collecting cost data. Research on ABC and its applications has been focused on the organizations in developed countries

¹ Kenji Fukute, et al. Op. Cit. p294.

² OFILEANU DIMI, BUMBESCU SORINA SIMONA, TARGET COSTING – THE RESPONSE OF THE MANAGERIAL ACCOUNTING TO CHANGES IN THE ENVIRONMENT, Annals of the „Constantin Brâncuși” University of Târgu Jiu, Economy Series , ALBA IULIA, Issue 3/2014, p48.

³ Kenji Fukute, et al. Global Cost Management Solution Supporting Business Strategy, Hitachi Review, a technical journal, 2015, Vol. 64, No. 5, p294.

mainly, only little has been implemented successfully in the organizations in developing countries. ABC not only measures the cost and performance of activities, resources and cost objects, but also points out the causal relationship between cost drivers and activities¹.

Activity-Based Costing is a methodology of “costing” category that attempt to make e detailed analysis of the indirect cost by converting them into direct costs. According to this method the costs are derived from the activities rather than the products, and the products absorb these costs from the activities. In the ABC method more than one cost drivers are used².

Classification of activities can be carried out on the ones that add value of products and services (due to which customers are willing to bear the costs of such activities over the product price) and those activities that do not add value but increase the time and costs of production. In this regard, the ABC method contributes to an increase of the business efficiency by eliminating non-productive activities. The basic premise of ABC method is that the products and services consume activities, while activities consume resources and thus cause the occurrence of the costs³.

ABC is clarified before in chapter two, and it turns out that it's an appropriate gateway to the development of existing cost accounting systems and its role is to provide more accurate and detailed information on the production and costs of different products and activities in a way that helps management to make more rational decisions.

4.2.4 Activity Based Management

Activity Based Management ABM is a system wide, integrated approach that focuses management attention on activities with the objectives of improving customer value and the profit achieved by providing this value⁴.

ABM use the information developed in the project and data are collected under an ABC system, which is a system that is used to accurately determine the full costs of services and products. ABM pays attention to the value-added from customers and the profit of the company gained by providing such value-added activity. According to Agrawal, Mehra and Siegel, an

¹ Hailiang Huang, Chaofeng Zhang, Op. Cit. p14.

² Marsel Sulanjaku, Ali Shingjergji, Op. Cit. p47.

³ Bojan Savić, Zorica Vasiljević, Dragan Đorđević, Op. Cit. p 1010.

⁴ Don R. Hansen, Maryanne M. Mowen, Op. Cit. p591.

ABM system can help to fulfill what the manager needs to get dynamic information in areas such as¹:

- A. Managing and motivating cost improvement.
- B. Improving organizational learning.
- C. Supporting cost-based operational decisions.

The Activity-Based management model has two dimensions; a cost dimension and a process dimension. The cost dimension provides cost information about resources, activities, and cost objects of interest such as products, customers, suppliers, and distribution channels. The objective of the cost dimension is improving the accuracy of cost assignments. The second dimension, the process dimension, provides information about what activities are performed, why they are performed, and how well they are performed. This dimension's objective is cost reduction. It is this dimension that provides the ability to engage in and measure continuous improvement².

- The principles of ABM

The basic principles of ABM and ABC methods have been developed based on a research project sponsored by fifty organizations through the world under direct guidance of CAM-I director, Tom Pryor,³

1. The principle of identification of activities causes.
2. The principle of identification of customer related to activity / process.
3. The principle of jointly management.
4. The principle of culmination performances.
5. The principle of elimination of non-value.
6. The principle of cooperation and disciplinary liability
7. The principle of permanent improvement of activities.
8. The principle of updating information.
9. The principle of objectives identity.
10. The principle of professional satisfaction.

ABM includes cost driver analysis, activity analysis and performance measurement. Activity analysis is done with an objective to eliminate those activities that do not add value to the product and in turn, reduce product costs. ABC measures performance of activities, determine the output costs

¹ Hailiang Huang, Chaofeng Zhang, Op. Cit. p14.

² Don R. Hansen, Maryanne M. Mowen, Op. Cit. p591.

³ Sorinel Capusneanu, Activity-Based Management principles and implementation opportunities of the ABM system, Metalurgia international, Romania, VOL 14(11), 2009, pp. 2-3.

and identify the possibilities for making the process more efficient and effective. Instead of focusing on resources, ABM bases management decisions on activities, thereby providing a completely new perspective on company operations. Rather than arbitrarily assigning resources to activities, ABM provides managers with the crucial ability to question the relevance of activities and hence optimize the resources allocated to them. ABM's main advantage is that, by identifying company-specific performance measures, it focuses on cost management activity and also improves planning techniques and the tracking of established goals¹.

In simple terms ABC is used to answer the question, "What do things cost?" while ABM takes a process view to understand what causes costs to occur. Using ABC data, ABM focuses on how to redirect and improve the use of resources to increase the value created for customers and other stakeholders. The key differences between ABC and ABM are²:

- ABC focuses on understanding costs and their drivers; ABM seeks to change them;
- ABC can provide information on process, product, and market performance; ABM finds ways to improve them;
- ABC is cost centered; ABM lies at the heart of the management process;
- ABC is the result of a static analysis of the organization; ABM is embedded in the dynamics of change;
- ABC is predominantly historical and focused on controlling existing costs; ABM is forward looking, seeking ways to avoid unnecessary costs and put existing resources to maximum use;

- ABC reports on internal operational and tactical results; ABM is strategic, focused on understanding the key elements of value from the customer's perspective;
- ABC is a source of explanatory data; and
- ABM provides actionable information.

Benefits derived from ABM's use include³:

- Identification of redundant costs;
- Analysis of value-added and non-value-added costs;
- Quantification of the costs of quality by element;

¹ Sailaja A, P C Basak, K G Viswanadhan, Activity Based Cost Management: An Effective Tool for Quality Performance Measurement in Manufacturing Industries, International Journal of Scientific & Engineering Research Volume 4, Issue 1, 2013,p 4.

² Institute of Management Accountants, Implementing Activity-Based Management: Avoiding the Pitfalls, 1998, file:///E:/ABC/quationair/Implementing%20Activity%20Based%20Management.pdf.

³ Institute of Management Accountants, Op. Cit. p5.

- Identification of customer-focused activities;
- Analysis of the cost of complexity;
- Identification of process costs and support of process analysis;
- Measurement of the impact of reengineering efforts;
- Better understanding of cost drivers;
- Evaluation of manufacturing flexibility investments; and
- Activity-based- budgeting.

To summarize, Activities aim to transform inputs into value-based outputs. Subsequently, ABM is to use cost-of-activity information and to eliminate activities that do not add value, thus helping to manage long-term cost to improve processes and achieve consumer satisfaction.

4.2.5 Resource Consumption Accounting:

Resource consumption accounting (RCA) is an emerging management accounting method that blends the advantages of German managerial accounting's emphasis on resources with those of the activity/process view provided by activity-based costing (ABC)—all couched in an enterprise-wide decision-support system. This system goes far beyond “cost accounting” to provide superior underlying information (broader availability and greater accuracy), which is fully integrated throughout the organization across the various reporting and planning systems¹.

RCA meets the cost management requirements of intricately economic environment, and provides a set of reasonable solutions for cost management. The application of RCA in cost accounting and managements helps enterprise to analyze and utility the production capacity, and calculate the cost more accurately. RCA distributes appropriately the cost among the particular processes and products, and then divides the types of resource consumption in detail, at the same time uses the replacement cost depreciation, thus fundamentally eliminates the unequal distributions to the similar products consumed similar resources and support activities. In addition, it helps to construct a precise cost control system for enterprises. RCA follows the principle of combining the analysis of resource and cost, and adopts the method of variance analysis and cost controlling for the whole control of cost. It differentiates the value-added and non-value-added activities, optimizes activity chain, eliminates the non-value-added activities, reduces waste and cuts down costs in terms of value streams. RCA establishes definitely quantitative indicators for the cost controlling of

¹ Sally Webber, B. Douglas Clinton, Op. Cit. p1.

enterprise following the path of “resource activity planned output of products”, so that enterprises could disintegrate the cost indexes, analyze the cause of differences, trace and eliminate the adverse variance, and point a direction for cost controlling¹.

This system has been reviewed before in chapter two, RCA system focuses on resources and considers them the main source of cost and works on analyzing production capacity to show idle capacity, and it is consider one of the most modern cost management systems.

4.2.6 Just-in-Time System

The literature of just in time system has identified just in time as a system that making what customer needs and when it needs in the quantity needed by using both of minimum resource of people and materials. Gyampah and Gargeya described the just in time system as strategy in the long-term that can encourage excellence and reduce unused during the whole organization².

The basis of Just-In-Time (JIT) is the concept of ideal production. It centers on the elimination of waste in the whole manufacturing environment, from raw materials through shipping. Just-In-Time is defined as “the production of the minimum number of different units, in the smallest possible quantities, at the latest possible time, thereby eliminating the need for inventory. Remember, JIT does not mean to produce on time, but to produce just in time³.

According to Kannan and Tan the main goals of using JIT system is simplifying the process of just in time system to elimination the waste and more controlling on raw materials and focusing on protective maintenance before the problem happened. According to Voss and Robinson , the aims of just in time system to improve productivity indicators by elimination of waste which lead to high quality. Moreover, the main goals of just in time system improving products quality and reduce the costs by using high techniques levels. In addition, the goals of just in time system is reduce set up time and inventories,

¹ Qiong ZHANG, Xiucheng DONG, Rong HUANG, The Application of Resources Consumption Accounting in an Enterprise, 2nd International Conference on Artificial Intelligence, Management Science and Electronic Commerce (AIMSEC), Zhengzhou, China, 2011, p 2484.

² Yazan Emnawer Al Haraisa, Just-In-Time System and Its Impact on Operational Excellence: An Empirical Study on Jordanian Industrial Companies, International Journal of Business and Management, VOL 12(12), 2017, p 158.

³ The Institute of Cost Accountants of India, Op. Cit. p6.13.

emphasis on continuous improvement and knowledge of worker, layout of equipment, eliminate waste and achieve zero defects goals¹.

JIT manufacturing and purchasing systems offer a prominent example of how managers can use the strategic concepts to bring about significant changes within an organization. Firms that implement JIT are pursuing a cost reduction strategy by redefining the structural and procedural activities performed within an organization. JIT can help add value by reducing waste. Successful implementation of JIT has brought about significant improvements, such as better quality, increased productivity, reduce lead times, major reductions in inventories, reduced setup times, lower manufacturing costs, and increased production rates².

According to Hailiang Huang and Chaofeng Zhang the aims of JIT are to eliminate waste and improve the flow of materials so that value is added by the transformation process. Once JIT is achieved, it can help the company to reduce cost, improve quality and to become more flexible in decisions. Under JIT, it is necessary that the suppliers can deliver the right material of the right quality in a right quantity through a right way. This not only requires a long-term relationship with a supplier, but additionally needs some supporting techniques e.g. electronic data interchange. Moreover, the company can provide training activities for its employees to perform multiple tasks, e.g. how to use, maintain and repair the equipment. By doing so, this can help the company to improve its production efficiency and save costs³.

Foster and Horngren propose four fundamental aspects of JIT⁴:

- 1- Managers would eliminate all resources and activities that do not add value to a product.
- 2- Quality is paramount and rework is virtually eliminated.
- 3- Managers strive for continuous improvement in efficiency.
- 4- The visibility of value-added activities versus non-value-added ones increases so that it is clear when JIT objectives are being met.

- Benefits and limitations of JIT

1-Benefits:

¹ Yazan Emnawer Al Haraisa, Op. Cit., p 159.

² Don R. Hansen, Maryanne M. Mowen, Op. Cit. p552.

³ Hailiang Huang, Chaofeng Zhang, Op. Cit. p15.

⁴ Maurice L. Hirsch, Advanced Management Accounting, 2ed ed., South-western publishing Co., U.S.A, 1994,P 127.

Benefits touted as results of JIT implementation include¹:

- Reductions in down time.
- Reductions in inventory.
- Reductions in scrap and re-work.
- Reductions in workspace.
- Increased inventory turns.
- Increased labor utilization.
- Increased equipment utilization.
- Improved service to customers.

2-Limitations:

Although the benefits of using JIT are numerous and cited more frequently than any potential limitations, several shortcomings have been identified as follows²:

- There exist many cultural differences which may be intrinsically tied to JIT success. The magnitude of their impact may be difficult to measure because of their nature.
- The potential to cause problems for the organization which relies heavily on safety stocks to absorb any increases in demand.
- Loss of team autonomy is a possible result of reducing or eliminating buffer inventories. Which result in greater amounts of stress and pressure placed upon the worker to perform, and this serves to reduce the flexibility of workers to discuss possible solutions to problems. This is a function of quality circles, which are an important part of JIT. Reduced buffer inventories and workers flexibility contradict the other aspects of JIT.
- JIT success may be 'industry specific', i.e. craft-oriented businesses are considered to be better candidates for a JIT program than organizations producing commodity-type products.

❖ Back Flush Accounting:

Back flush Costing which is also called Delayed or Post Deduct Costing is one of the simplest methods of cost accumulation that is used by companies that have adopted the JIT system. However, the JIT is not just a technique or techniques for accumulating costs and has a broader philosophy that focuses on continuous simplification and reduction of loss and waste in all levels of

¹ The Institute of Cost Accountants of India, Op. Cit. p6.14.

² Akbar Javadian, Dr. K. Nagendra Babu, Hamidreza Fooladi, Just-in-Time Manufacturing System: From Introduction to Implement, International Journal of Economics, Business and Finance, Vol. 1, No. 2, 2013, pp. 14-15.

the institution's activities and one of the goals of this system is zero ending inventories. The new costing system which is connected with the aim of responding to the requirements of the JIT production system is called back flush costing. Back flushing is a theoretically elegant solution to the complexities of assigning costs to products and relieving inventory, but it is difficult to implement¹.

The researcher believes that JIT is a very successful system in reducing costs through minimizes or eliminates inventory, as well as reducing faults, waste reduction and defective production, but this method cannot be used in developing countries because, for example, delaying only one supplier in the delivery of raw materials leads to the suspension of the entire production process and cause loss more than that you have already saved.

4.2.7 Total Quality Management

TQM is a manufacturing program aimed at continuously improving and sustaining quality products and processes by capitalizing on the involvement of management, workforce, suppliers, and customers, in order to meet or exceed customer expectations².

The aim of TQM is to identify and reduce the costs that are related to the quality of products or services, which could occupy significant percentage of the total costs that a company normally has. It is impossible to eliminate these costs because they are affected by the total quality. Some costs may be reduced but may also be increased elsewhere³.

We consider productivity enhancement as a process to achieve higher levels of output while consuming same or lesser amounts of input resources. If the same output level is reached in a shorter time period, it indicates improved productivity. It is in this respect, that projects designed to improve productivity must also consider time as a key resource. Total quality management (TQM) is about leadership, planning and improvement and it is defined as “managing the entire organization so that it excels on all dimensions of products and services that are important to the customer”. An integral part of a TQM system is continuous improvement through a

¹ Nasieku Tabitha & Oluyinka Isaiah Ogungbade, Op. Cit., p 54.

² Kristy O. Cua, Kathleen E. McKone, Roger G. Schroeder, Relationships between implementation of TQM, JIT, TPM and manufacturing performance, Journal of Operations Management, USA, VOL 19, 2001, p 676.

³ Hailiang Huang, Chaofeng Zhang, Op. Cit. p15.

philosophy of product and process improvement as a never-ending journey. Increased levels of productivity result from improvement¹.

In America, the main trend of business is focusing on the continuous improvement of quality, such as quality products, quality systems and quality improvements. "Improve quality, and all else will follow" has been summarized as the attitude of the world-class company. When TQM is used by a company, it may increase prevention and appraisal costs at the beginning. However, it will help the company to reduce and eliminate internal and external failure costs due to improvements towards high quality performance. Setting up a system of preventing goods of bad quality can help the company to reduce and eliminate appraisal costs as well. Generally, quality related costs are very difficult to recognize by companies, ABC provides considerable help to make companies aware of such costs. TQM provides significant help for companies to reduce their non-value added activities and improve value added activities².

Quality costing: Quality costs are the costs associated with preventing, detecting, and remediating product issues related to quality. Quality costs do not involve simply upgrading the perceived value of a product to a higher standard. Instead, quality involves creating and delivering a product that meets the expectations of a customer. This method takes part in "costing" category of SCM³.

Information about costs of quality should be reported to managers regularly to help them make decisions. If quality costs are grouped and reported to managers in a regular way, managers can make timely and effective decisions. Cost accountants should make these costs available in the accounting records as well as in reports. Much of the information regarding quality costs may be available from the existing accounting records. Information about quality costs can be obtained from time sheets, expense reports, purchase orders, rework reports and from many other sources. In addition, investigation of expense reports can provide managers with information about measurement or inspection costs. If any data are not

¹ Prof. Marius-Dan DALOTA, INCREASING PRODUCTIVITY BY TOTAL QUALITY MANAGEMENT AND CONSTRAINT MANAGEMENT, *Holistic Marketing Management Journal*, Romanian, 2011, vol. 1(3), p9.

² Hailiang Huang, Chaofeng Zhang, *Op. Cit.* p15.

³ Marsel Sulanjaku, Ali Shingjergji, *Op. Cit.* p48.

available from the existing reports, estimates can be made to arrive at the required information¹.

This system was mentioned before in chapter three in detail. To sum up, TQM is an integrated administrative system that seeks continuous improvement in production and performance in order to satisfy the customer and its application to reduce costs and increase profitability. Measuring quality costs of all types lead to higher quality and lower total costs by providing information that helps different administrative levels in improving production and managing costs.

4.2.8 Balanced Scorecard

The Balanced Scorecard [BSC] is a strategic planning tool developed by Kaplan and Norton (1996) as a response to the assumption that organizations only exist to satisfy stockholders. It is based on a four dimensional framework, where each dimension represents a different set of stakeholders: Learning and Growth; Internal Business Processes; Customers; and Finance. According to the authors, the BSC is based on the rationale that skilled employees will improve process quality and cycle time, which therefore leads to on-time delivery and customer loyalty. At the end of the chain of improvements, the organization is very likely to achieve higher returns on investments and, consequently, shareholder satisfaction. In other words, the BSC is a performance management framework whose main contribution to the literature is to enlarge the number of interested parties and actors within the process².

The Balanced Scorecard permits an organization to create a strategic focus by translating an organization's strategy into operational objectives and performance measures for four different perspectives; the financial perspective, the customer perspective, the internal business process perspective, and the learning and growth (infrastructure) perspective. The Balanced Scorecard is an effective way of implementing and managing a company strategy. A number of companies attribute their recent financial success to this strategic performance management system³.

¹ İlhan Dalcı, Veyis Naci Tanış, Quality Costs and Their Importanc in Cost and Management Accounting, Cukurova University, Faculty of Economics and Administrative Sciences, Turkey, 2002, P 140.

² Ricardo Corrêa Gomes, Joyce Liddle, The Balanced Scorecard as a Performance Management Tool for Third Sector Organizations: the Case of the Arthur Bernardes Foundation, Brazilian Administration Review, Brazil, VOL. 6, NO. 4, 2009, p 355.

³ Don R. Hansen, Maryanne M. Mowen, Op. Cit. p640.

The Balanced Scorecard, incorporates stakeholder interests endogenously, within a coherent strategy and value-creation framework, when outstanding performance with those stakeholders is critical for the success of the strategy¹.

Kaplan and Norton recommend a nine-step process for creating and implementing the balanced scorecard in an organization²:

1. Perform an overall organizational assessment.
2. Identify strategic themes.
3. Define perspectives and strategic objectives.
4. Develop a strategy map.
5. Drive performance metrics.
6. Refine and prioritize strategic initiatives.
7. Automate and communicate.
8. Implement the balanced scorecard throughout the organization.
9. Collect data, evaluate, and revise.

The purpose of the balanced scorecard is; to guide, control and challenge an entire organization towards realizing a shared conception of the future. Within the perspectives the vision is expressed as a number of more specific objectives. Measures and targets are set and the organization then puts in place action plans to meet the set targets³.

There are many benefits and challenges to the balanced scorecard. The primary benefit is that it helps organizations translate strategy into action. By defining and communicating performance metrics related to the overall strategy of the company, the balanced scorecard brings the strategy to life. It also enables employees at all levels of the organization to focus on important business drivers. The main challenge of this system is that it can be difficult and time-consuming to implement. Kaplan and Norton originally estimated that it would take an organization a little more than two years to fully implement the system throughout the organization. Some organizations implement it quicker, for some it takes longer. The bottom line is that the

¹ Robert S. Kaplan, Conceptual Foundations of the Balanced Scorecard, Harvard Business School, Harvard University, Paper originally prepared for C. Chapman, A. Hopwood, and M. Shields (eds.), Handbook of Management Accounting Research: Volume 3 (Elsevier, 2009), 2010, p 12.

² Margarita IŠORAITĖ, THE BALANCED SCORECARD METHOD: FROM THEORY TO PRACTICE, INTELLECTUAL ECONOMICS journal, mykolas romeris university, Lithuania, 2008, No. 1(3), p20.

³ Meena Chavan, The balanced scorecard: A new challenge, Journal of Management Development, VOL. 28(5), 2009, p 398.

balanced scorecard requires a sustained, long-term commitment at all levels in the organization for it to be effective¹.

The researcher concludes from the above that, the BSC system is; a strategic planning tool that requires compatibility or matches the objectives of senior management with the lower departments, which means that the success of this method must be with participation and commitment from the higher and lower departments in the same time. This method is comprehensive or has many measurements. These measures include internal and external measurements, financial and non-financial, historical and future measurements. Accordingly, this makes the system difficult to implement and needs a longer time to apply and a great effort from the whole institution, which may lead to a lack of focus.

4.2.9 Benchmarking

The essence of benchmarking is the process of identifying the highest standards of excellence for products, services, or processes, and then making the improvements necessary to reach those standards, commonly called “best practices”. The justification lies partly in the question: “Why re-invent the wheel if I can learn from someone who has already done it?” Jackson Grayson Jr, chairman of the Houston-based American Productivity and Quality Center, which offers training in benchmarking and consulting services, reports an incredible amount of interest in benchmarking².

Benchmarking is a process included in “planning control and performance measurement” category where a company is in a continuous attempt of comparing the business processes with the industry best companies’ practices. In benchmarking not only quantitative variables are taken in consideration but also qualitative like quality of competitor’s products, timing processes, results etc.³

Benchmarking is an approach of setting goals and measuring productivity based on best industry practices. Benchmarking helps in improving performance by learning from best practices and the processes by which they are achieved. It involves regularly comparing different aspects of performance with the best practices, identifying gaps and finding out novel methods to not only reduce the gaps but to improve the situations so that the

¹ Margarita IŠORAITĖ, Op. Cit., p 20.

² Dean Elmuti, Yunus Kathawala, An overview of benchmarking process: a tool for continuous improvement and competitive advantage, Benchmarking for Quality Management & Technology, Eastern Illinois University, USA, Vol. 4 No. 4, 1997, p 229.

³ Marsel Sulanjaku, Ali Shingjergji, Op. Cit. p47.

gaps are positive for the organization. Benchmarking is periodical exercise for continuous improvement within the organization so that the organization does not lag behind in the dynamic business environment¹.

Types of benchmarking:

Table (4.2.1) Types of benchmarking

Types	Definitions
Performance benchmarking	It is the comparison of performance measures for the purpose of determining how good our company is as compared to others.
Process benchmarking	Methods and processes are compared in an effort to improve the processes in our own company.
Strategic benchmarking	The study is undertaken when an attempt is being made to change the strategic direction of the company and the comparison with one's competition in terms of strategy is made.
Internal benchmarking	When comparisons are made between departments/divisions of the same company or organization.
Competitive benchmarking	Is performed against "best" competition to compare performance and results.
Functional benchmarking	A benchmarking study to compare the technology/process in one's own industry or technological area. The purpose of this type of benchmarking to become the best in that technology/process.
Generic benchmarking	Comparison of processes against best process operators regardless of industry.

M. Khurram S. Bhutta, Faizul Huq, Benchmarking – Best Practices: An Integrated Approach, Benchmarking: An International Journal, USA, Vol. 6 No. 3, 1999, p257.

The basic content of the benchmarking process is described as under²:

Step 1: plan the study; an organization should benchmark processes that are aligned with the company's strategic direction.

Step 2: form the benchmarking team.

Step 3: identifying partners. The team then identifies potential benchmarking partners- companies that are considered by the business community at large to be "world class" in that process.

¹ The Institute of Cost Accountants of India, Op. Cit. p3.77.

² M. Khurram S. Bhutta, Faizul Huq, Op. Cit. pp. 258-259.

Step 4: collect and analyze information. This step is perhaps the heart of the benchmarking process. Not only are data collected, but also analyzed and turned into information to be compared with one's own.

Step 5: adapt and improve.

- Merits and Demerits of Benchmarking:

The important merits and Demerits of benchmarking are summarized as follows¹:

1-Merits:

- It increases customer satisfaction.
- It leads to significant cost savings and improvements in products and services.
- It helps in improving strategic planning by providing assessment of strengths and weaknesses of current process.

2-Demerits:

- It increases the diversity of information which must be monitored by management. This increases the potential for information overload.
- It may reduce managerial motivation if they are compared with a better resourced rival.
- There is a danger that confidentiality of data will be compromised.
- It encourages management to focus on increasing the efficiency of their existing business instead of developing new lines of business.
- Successful benchmarking firms may find that they are later overloaded with requests for information from much less able firms whom they can learn little.

To sum up, benchmarking is a tool for comparison and measuring leading companies in order to learn from others and improve the development and the performance. The researcher believes one of the most serious flaws is the risk of penetrating confidential data, and it kills creativity.

4.2.10 Kaizen Costing:

Kaizen Costing: It is a costing technique to reflect continuous efforts to reduce product costs, improve product quality, and/or improve the production process after manufacturing activities have begun. Kaizen costing involves making continual, incremental improvements to the

¹ The Institute of Cost Accountants of India, Op. Cit. p3.81.

production process during the manufacturing phase of the product/service lifecycle, typically involving setting targets for cost reduction¹.

Yashihuro Moden defines kaizen costing as “the maintenance of present cost levels for products currently being manufactured via systematic efforts to achieve the desired cost level.” The word kaizen is a Japanese word meaning continuous improvement. ‘Kaizen costing is based on the belief that nothing is ever perfect, so improvements and reductions in the variable costs are always possible’².

The objective of kaizen costing is to reduce actual costs to manufacture a product below the standard cost. Standard cost system generally aim to achieve the cost standards set by management while kaizen costing systems are more concerned with reducing actual costs below standard costs. The potential cost reductions are smaller with kaizen costing because the products are already in the manufacturing stage of their life cycles and a significant portion of costs will have become locked-in³.

The system is based on achieving small incremental adjustments in the product’s manufacturing process, rather than the design process (target costing approach) so as to retain the product’s functionality in line with customer requirements being a key to successful demand conditions. The continuous cost reduction involves four dimensions which must be integrated in the management of an organization⁴:

- Taking into account the operating environment of the business, such as: markets and the activities of competitors;
- Integrating the skills of the various functions of the enterprise;
- Viewing product decisions from a futuristic perspective i.e. effect of current decisions on future outcomes; and,
- Creating a more stringent connection between budgeting and the control of the current activity.

Thus, the entire process is holistic in nature comprising the activities of all departments in the organization, which can be achieved through effective

¹ BANGLADESH COST ACCOUNTING STANDARDS BCAS – 12, Op. Cit. p20.

² The Institute of Cost Accountants of India, Op. Cit. p6.12.

³ BANGLADESH COST ACCOUNTING STANDARDS BCAS – 12, Op. Cit. p21.

⁴ Pius Vincent Chukwubuikem, Francis Chinedu, Olamide Mofolusho, Product Cost Management via the Kaizen Costing System: Perception of Accountants, Journal of Management and Sustainability, Vol. 3, No. 4, 2013, p 115.

communication procedures and the institutionalization of a Kaizen Culture at the corporate strategic level.

Point of strength in KC is its close relationship with the company's planning process and hence the company can evaluate its plans, progresses and long-term goals. KC activities include incremental improvements, continuous reduction of production cost, and constant imprudent in designing and developing products. In fact, KC is continuous improvement and recovery by eliminating waste and reducing the cost and it is related to the reduction of production cost and existing processes. This costing is a method to ensure manufacturing of products that meet the required quality, customer satisfaction, usability and affordable price to maintain the competitiveness of products and focuses on continuous cost reduction of products that are really manufactured in the company¹.

Kaizen means continuing improvement involving everyone – managers and workers. In terms of the time consumption, this activity is above the duration of the internal process improvement. Kaizen is people-oriented and its application involves everyone in the organization from top management to workers at the shop floor. It can therefore, support any management activities including cost reduction and time management, safety management, product design, productivity improvements, zero defects, maintenance management or new product development. This multiplicity of methods and contexts means that kaizen is highly versatile both as a concept and a technique².

- Potential Disadvantages of Kaizen³:

-Kaizen signals a permanent change of management system. Once implemented it is hard to return to previous management systems should the need or desire arise. Also, since Kaizen is intertwined with Japanese culture, it may be difficult to apply in other cultural contexts.

-Kaizen can increase the burden on lower level management as they not only have to spend time on the shop floor (the front line) facilitating the implementation of the approach, but they may also have to work after hours to complete their routine administration tasks.

¹ Amirreza Ramezani, Ali P razmeh, Kaizen and Kaizen Costing, Academic Journal of Research in Business & Accounting, Vol. 2, No. 8, 2014, p 49.

² Suhaiza Zailani, Mohd Rizaimy Shaharudin, Bernard Saw, Impact of kaizen on firm's competitive advantage in a Japanese owned company in Malaysia, Int. J. Productivity and Quality Management, Vol. 16, No. 2, 2015, p 184.

³ Chartered Institute of procurement & supply, Kaizen - CIPS Procurement Topic, <https://pdfs.semanticscholar.org>, p3.

-Kaizen can lead to diminishing returns. The continuous improvement approach leads to a focus on smaller and smaller details with lower potential returns, without a concurrent reduction in effort.

To recapitulate, Kaizen is a system that aims to continuously reduce the cost of production through gradual small adjustments covering all activities of the institution. But it requires collective efforts and needs high skill, adequate training and workers' awareness.

4.2.11 The Theory of Constraints (TOC)

The theory of constraints is proposed as a management philosophy to attain strategic goal within the portion of the value chain that a company defines for itself¹.

The Theory of Constraints is not a cost accounting method, but it has far reaching implications for cost management. The theory was developed by Eli Goldratt who subsequently established the Goldratt Institute to extend the practice of the theory. The initial motivation for developing the theory was to seek an improved way of production. It was designed to identify the most efficient way of increasing production throughput. Goldratt and Cox argued that the pace of the slowest process in the production run determined the pace at which production could function. Hence, everything had to be geared to ensuring that there were no delays in that slowest part of the process. Unlike JIT which has the goal of eliminating all inventories, TOC allows for a minimum buffer of stock to be held immediately before the process with the slowest pace so that unexpected interruptions in delivery from the other processes will not delay this critical process².

Theory of constraints has a wide range of implementation scale. Theory can be applied in production, logistics, supply chain, distribution, project management, accounting, research and development, sales and marketing and so on. As the main idea is that every system has at least one weakest point, in literature there are lots of studies which have different concentration areas and reveals different issues of TOC. Therefore, there are several definitions for TOC. On the other, there is a common point which is defined in almost every study, constraint. The main aim of every company is increasing the profit. According to this point of view, constraints are main

¹ Maurice L. Hirsch, Op. Cit. p 118.

² Alireza Azimi Sani, Mahdi Allahverdizadeh, Target and Kaizen Costing, International Journal of Social, Behavioral, Educational, Economic, Business and Industrial Engineering, Vol:6, No:2, 2012, P174.

obstacles at achieving companies' aims. In other words, everything which exists in the road of having more profit is considered as a constraint. So, if companies can handle constraints in their system and manage these constraints, they would have a continuous improvement management system thus they could achieve higher profits¹.

- Constraints:

A bottleneck occurs when a resource is limited so that the needs to use that resource exceed its capacity. The basic idea in TOC is to make sure that the products given first priority through the bottleneck are components and products that can be sold rather than ones that will end up sitting in process or waiting in the warehouse for some possible future need. Manufacturing constraints are identified by looking at where capacity for throughput (making products for sale, not for inventory) is less than demand. Once we identify the various constraints in the system, the next step is to see the throughput per unit of constraints resource (in dollars per hour or per person-whatever the proper measure is for that resource) for each product (or component) that passes through that constraints. This transition in thinking is similar to how we move from cost-volume-product analysis with no constraints to one with constraints².

When there are no constraints, a manager wants to maximize contribution margin by making products with the highest individual contribution margins per unit. If each product uses constrained resource equally, the same decision rule holds. However, when products use resources unequally and some resources are constrained, then we want to maximize contribution margin per the scarce resource. The next step is to either use some modeling program such as linear programming or a more dynamic process such as TOC³.

Thinking process in the Theory of Constraints provides a set of holistic processes and rules, all based on a systems approach that exploits the inherent simplicity within complex systems through focusing on the few "leverage points" as a way to synchronize the parts to achieve ongoing improvement in the performance of the system as a whole. The philosophy of TOC is based on three simple assumptions⁴:

¹ Zeynep Tuğçe Şimşit , Noyan Sebla Günay , Özalp Vayvay, Theory of Constraints: A Literature Review, Procedia - Social and Behavioral Sciences, Turkey, VOL. 150, 2014, p 931.

² Maurice L. Hirsch, Op. Cit. p 119.

³ Ibid, p 119.

⁴ JOANNA NOWAKOWSKA, EWA MOROZ, THEORY OF CONSTRAINTS AS AN EFFECTIVE TOOL FOR SUPPLY

- Basic Assumption 1: Everything within a system is connected by cause and effect relationships. Identification of the causes leads us to converge onto an apparent core problem/contradiction/conflict.
- Basic Assumption 2: All contradictions can be resolved without compromise – our level of understanding and our assumptions hold the contradiction in place. A compromise is not usually a win-win solution.
- Basic Assumption 3: There is no resistance to improvement people do not embrace change because we have not brought them to see the win for them.

The five focusing steps of TOC:

To summarize the objective of TOC is to increase throughput while managing inventories and decreasing operating expenses. The basic steps to achieve this end are to¹:

- 1- Identify the constraints.
- 2- Decide how to make the best use of the constraints.
- 3- Subordinate all other decisions to the decision in step 2.
- 4- Reduce the constraints limitations on the system's performance.
- 5- Go back to step 1.

Advantages and disadvantages of application Theory of constraints²:

- Advantages:

- Potential for tremendous increases in productivity with minimal changes to operations.
- Most powerful and cost effective tool for increasing production capacity.
- Very simple to communicate and apply, making it ideal for shop floor teams.
- Great for fostering teamwork as different areas become aware of the constraint and the need to work together to assist the constraint process.
- Great process for kick starting improvement efforts as it provides immediate and very tangible benefits.
- Allows growth of turnover/productivity without the need for additional space or staff.
- Provides a means to evaluate the true value of changes (using T, O, I), and utilize this to select the best options, and drive the right behavior/decisions.

- Disadvantages:

CHAIN MANAGEMENT, Advanced Logistic Systems, Vol. 7, No. 1, 2013, p 72.

¹ Maurice L. Hirsch, Op. Cit. p 121.

² Michal Marton, Iveta Paulova, Applying The THEORY OF CONSTRAINTS In The Course OF Process Improvement, Institute of Production Management and Quality, Faculty of Materials Science and Technology in Trnava, Slovak Technical University Bratislava, VOL 18 (29), 2010, p 74.

- Can be difficult to apply if the constraint process is constantly moving (for example if the nature of the work sees dramatically different and difficult to predict demands on various production resources).
- Can be difficult to apply in a jobbing environment (however it is still very applicable).

To summarize the above, the TOC model is an administrative model where the focus is not on all production processes, but the focus is on the weak link only in the production processes, so a simple change in the production process can have a significant impact on the profitability of the institution. But the application of this theory needs time and shows its impact on cost management in the long term only.

The researcher believes, all these methods and systems that have been presented are interconnected and shared in some things and some may be complementary to the other. Therefore these methods can be used alone to support a particular goal or can be used to integrate two systems or a set of systems to serve the overall objectives of the enterprise.

This section represents the strategic cost management techniques and tools, some of these techniques were reviewed in previous chapters, so were presented here briefly. Researchers do not agree on the number of the strategic cost management techniques, but those were the most techniques that have been agreed.

Chapter five

Field study

Data Analysis and Findings

This chapter presents the findings of the data analysis and it is presented in three sections. The first section presents Overview of food industries, and the process followed for measurement and validation of various constructs. Started by describing the descriptive statistics of the sample data then the respondent's demographic information, section two The measurement and validation process of constructs, section three the results of the path analysis and hypotheses testing.

Section One

Field study procedures

5.1.0 Introduction

This section concerns field study procedures, reviewing overview of food industries, and the process followed for measurement and validation of various constructs, describing the descriptive statistics of the sample data, then the respondent's demographic information.

5.1.1 Overview of food industries

There are more than 6.6 billion people in the world, every one of them have to eat. All these people need to eat every day, which makes the food industry one of the largest industries in the world.

Food industries are a group of industrial processes that aim to provide the community with its food energy needs, It is the process of converting ready-to-eat foodstuffs into food commodities based on a range of production processes to be suitable for human consumption by maintaining their validity for the longest possible period of time to protect them from being damaged by weather or from external influences such as fungi and bacteria¹.

Means all necessary operations and activities necessary for the conversion of materials in terms of form, appearance, composition or substance under the most appropriate operational and health conditions using appropriate media and technologies and other production and service inputs to produce a final product of nutritional and economic value².

Economic and social importance of the food industry sector:

The importance of food processing lies in³:

- Encourage horizontal and vertical expansion in agricultural production by absorbing surplus and reducing losses.
- Achieving food security and social and economic stability.
- Providing food when needed, times of scarcity and disasters.
- Provide food in remote, non-agricultural and war-affected areas.

¹ Nafisa Ali, Awatif Ezz El Din, Food industries and food safety in the monthly forum of the Faculty of Agriculture University of Khartoum, , A report published in the Sudan News Agency on 21/1/2018, <http://www.suna-sd.net/suna/showTopics/5167/ar>

² Dr. Mustafa Mohamed, Dr. Mohamed Ibrahim, Diagnostic study for the food industry, The qualitative conference for the food industry sector, Union of Sudanese Chambers of Industry, 2010, p2.

³ Ibid., p3.

- Supporting the national economy and increasing the volume of return on value added by exporting manufactured and semi-manufactured products, limiting imports, creating new jobs and establishing complementary industries.

The food industry sector, having attention in all countries of the world because of the benefit that is integrated with the agricultural sector in addition to its strategic importance and food security and its contribution to the self-sufficiency of countries. Therefore, the food industry is a supportive and catalyst for the development of the agricultural sector and a key pillar in achieving food security and economic stability. And increase domestic production¹.

The Sudanese industry began to emerge as a natural result of the conditions created during the Second World War, when foreign imports were unable to arrive due to the disruption of the funding lines and the preoccupation of British industries (which were considered the main source of commodities in Sudan) in producing war supplies².

Industry started in Sudan in 1918 with cement factory. Food processing industry started in the 1940s with vegetable oil extraction and laundry soap production. The concept of the industrial development emerged in Sudan soon after independence. Future expansion in the industrial sector was achieved with established of sugar industry in 1960s³.

The food sector in Sudan is the largest sector in the structure of the manufacturing sector in terms of capital invested and the quality and number of industrial establishments operating. The final results of the comprehensive industrial survey project issued by the Ministry of Industry in 2005 indicated that the food industry sector represents 70% of the total number of industrial activities in Sudan and 50% of the industrial labor is concentrated in this sector, And contributes to the gross domestic product by an estimated rate compared with the rest of the industrial sectors, where the proportion up to 55%. The sector also contributes to raising the nutritional and economic value of food products, making them more acceptable and preferred by the

¹ Nafisah Ali, Op. Cit. p2.

² Daoud Saga Mohammed, A historical study of the role of the public sector for industry in Sudan in the period from 1956 to 1985, Thesis for PhD in History Philosophy, University of Khartoum, 2010, p 72.

³ Fatima Amir, The Impact of Activity-Based Costing System Application on Enhancing Company's Financial performance A Field Study of Manufacturing Industries Sector, PhD, Thesis Cost & Management Accounting, Sudan University of Science and Technology, 2013, p111.

consumer, as well as benefiting from its secondary products and the waste of its factories in creating new investment opportunities¹.

One of the most prominent features of the food industry in Sudan²:

- The magnified of cost component of the materials in the structure of the cost of production compared to the rest of the cost element, where the relative weight of the average 60.73%.
- The food industry is generally classified as labor-intensive, with a relative weight of 13.46% of the total cost.
- The food sector is classified by the relative weight of the cost of electricity in the structure of the cost of production, which represents an average of 3%, except for the ice sector, which is of a special nature.
- The cost of the service component in the potato chips and the carbonated water sector is higher than the cost of the material component. This is an exceptional situation for the cost structure of this sector, where the origin is the large cost of materials. This is due to the significant increase in the capital cost of fixed assets (the low level of energy utilized, which is reflected in the structure of the cost structure of production).

Classification of food industries in Sudan³:

- Edible oils sector.
- Dry food packaging sector (including sugar, flour, etc.).
- The jam and Halva sector.
- Meat and meat products sector.
- Juice, Soda and mineral water sector.
- Ice sector, refrigerated storage and freezing.
- Biscuit & Sweets Sector.
- The dairy sector and its products.
- Feed sector.
- Child food, food supplements and energy sector.

- Problems and constraints of the food industry in Sudan

There are many problems and obstacles facing the industrial sector in Sudan; one of the biggest problems is the high cost of the Sudanese product, starting with production inputs that carry heavy burdens of customs duties and levies that increase the cost of the final product and its competitiveness in the markets. These problems have negatively affected the reality of the industry

¹ Mustafa Mohammed, Mohamed Ibrahim, Op. Cit. p4.

² Ibid., p10.

³ Information Center, Ministry of Industry and Investment, State of Khartoum.

in a number of major cities (which are known of the existence of an estimated number of different industries such as food, textile, grain, etc.) in various states, especially after the secession of southern Sudan from Sudan. In the states Particularly the Red Sea, Al Jazeera, Kassala, North Kordofan and the Northern State, The industry has fallen back a lot. In the northern state, all the factories were closed, leaving only two factories: dates in Crema, fish canning in Wadi Halfa (old Halfa). And the same retreat in industry in the state of Al Jazeera, which was the second at the level of Sudan in this area, Where stopped more than 350 factories, mainly the fifteen textile factories, and all the oil factories, Which was affected by the high input prices of grain, which previously provided by the Al Jazeera project. In the Red Sea State the situation is more affected, where the mechanisms of 54 factories in the industrial zone have stopped in this economic city, which consider Sudan's maritime gateway¹.

The most common problems are the following points²:

- Weak infrastructure in the industrial areas, especially electric power, water, roads, civil defense, sanitation, security, etc.
- The lack of consistency and legislative interrelationship between laws of an economic, federal, state and local nature, thus negatively affecting the general climate of investment.
- Absence of economic and social philosophy to impose state fees and taxes.
- The collection of VAT on the entry of imported industrial inputs constitutes an additional burden on the industrial establishments.
- The customs authorities do not recognize the prices provided in the invoices for the imports, evaluation is done on an estimate basis. In addition to its objection to the application of concessions, which were granted in accordance with the law to encourage investment, which creating a conflict between the role of the Ministry of Investment and technical ministries and customs authorities as an executive.
- Lack of cost awareness among some investors and industrial establishments, relying mainly on the financial accounting system only as accounting information and data system.
- Dumping the local market with imported products similar to domestic production with insufficient procedures that achieve a kind of fair

¹ Dr. Badraddin Taha Osman, Industry in Sudan, Article published in the Encyclopedia of Sudan (Sudapedia) on 2/4/2017, <http://www.sudapedia.sd/ar/content/51>.

² Mustafa Mohammed, Mohamed Ibrahim, Op. Cit. pp. 11-12.

competition and protect the national industry without prejudice to the essence of the philosophy of the policy of liberalization.

- The majority of industrial products have not succeeded in finding a place in the world markets because of the lack of global requirements in terms of quality and prices, the lack of economic information on the world markets, some investors are not convinced of expenditure in the area of quality promotion and development of products to qualify for global competition, And the lack of promotion of manufactured products.

- Non-coordination of efforts in agricultural and industrial development.

- Continuous intervention by the various government agencies through federal, state and local laws and procedures.

- Weak financial capabilities of the banking system, so as not to cover the size of operational capital needs and the volume of investments in this sector. The current financing modalities granted by banks are a burden on the cost of the activity in relation to its high cost.

Other problems¹:

- Weak technical and economic feasibility studies.

- Lack of availability of raw materials and production requirements.

- Shortage of trained manpower.

- Maintenance problem.

5.1.2 Research Population and Sample

The population of this study is food industries firms operating in Khartoum - Sudan. The justification for this selection is because the establishment and evolution of managerial accounting systems are linked to industrial companies more than its association with service companies. Beside the industrial sector production is the largest manufacturing activity in the world industrial production is also one of the most complex and diverse manufacturing activities in the world. And choose the food industries from other industries because it's considered as one of the largest and the most important industries in the world.

The study employed non probability a purposive sampling, with purposive sampling; you need to use your judgment to select cases that will best enable you to answer your research question(s) and to meet your objectives. For this

¹ Badr al - Din Taha, Op. Cit., p3.

reason, it is sometimes known as judgmental sampling. You, therefore, need to think carefully about the impact of your decision to include or exclude cases on the research when selecting a sample in this way. Purposive sampling is often used when working with very small samples such as in case study research and when you wish to select cases that are particularly informative (Mark Saunders, Philip Lewis, Adrian Thornhill, 2016). The researcher chose nonprobability sampling for this research because of the inaccuracy of industrial company’s data and major official sample surveys of businesses use convenience selection, because of severe problems in getting respondent cooperation. Also it is cost effective and for its timeliness.

5.1.3 Response rate

It was well known that most of the companies for food industries located in three towns represent the capital of the country (Khartoum, Bahry, and Omdurman) therefore; the population of this study was the 397 factories. The researcher employed a convenient sample where self-administrated survey was used to distribute 195 questionnaires to the factories for food industries across the three towns, given to The study community consists of accountants, financial managers, cost accountants, production managers, and others related to the subject of the study from the employees of the food industrial companies were asked to fill out the questionnaire, the overall response rate was 89% this was considered as high rate due to questionnaires were given one by one to respondents and in researches used a self-administrated survey (Sekaran, 2003). Those who didn’t responded to fill out the questionnaire some were mentioned that they were not authorized to fill the questionnaires while others were not transparent in their justifications. Below is Table (5.1.1) to shows the summary of questionnaire response rate.

Table (5.1.1) Response rate of questionnaire

Total distributed questionnaires	195
Total questionnaires received from respondents	170
Valid questionnaires received from respondents	164
Invalid questionnaires	6

Questionnaires not received	25
Overall response rate	87%
Useable response rate	84%

Source: prepared By Researcher from the field study data 2018

5.1.4 General Information about the Respondents

Table (5.1.2) General Information about the Respondents

	Particular	Frequency	percent
Age	Under 30 years	54	32.9
	30 Less than 40 years	39	23.8
	40 Less than 50 years	46	28.1
	Over 50 years	25	15.2
Total		164	100.0
Educational Qualification	Bachelor's degree	85	51.8
	Higher Diploma	14	8.5
	Master's degree	44	26.8
	Ph.D.	17	10.4
	Other	4	2.5
Total		164	100.0
Specialization	Accounting	92	56.1
	Cost	14	8.5
	Business Administration	11	6.7
	Economy	7	4.3
	Other	40	24.4
Total		164	100.0
Professional qualification	SCCA	27	16.5
	AFAA	4	2.4
	ACCA	7	4.3
	CPA	6	3.7
	Other	120	73.1
Total		164	100.0
Job title	Financial Accountant	96	58.5
	Cost Accountant	8	4.9
	Financial Manager	25	15.2
	General Manager	5	3.1
	Other	30	18.3
Total		164	100.0
Years of Experience	Less than 5 years	14	8.5

	5 Less than 10 years	59	36.0
	10 Less than 15 years	71	43.3
	more than 15 years	20	12.2
Total		164	100.0
Age of the institution	Less than 5 years	5	3.1
	5 Less than 10 years	20	12.2
	10 Less than 15 years	30	18.3
	more than 15 years	109	66.4
Total		164	100.0
The markets in which the institution operates	Local	106	64.6
	regional	58	35.4
Total		164	100.0
Number of users in the foundation	10 Less than 50 users	2	1.2
	50 Less than 100 users	3	1.8
	100 Less than 150 users	45	27.5
	more than 150 users	114	69.5
Total		164	100.0
The cost system applied by the foundation	Traditional System	128	78.1
	ABC system	23	14.0
	RCA	3	1.8
	Other	10	6.1
Total		164	100.0

Source: prepared By Researcher from the field study data 2018

The table (5.1.3) shows the respondents characteristics ' in term of **Age** most of the respondents were under 30 years (32.9%), (23.8%) were found between 30- 40, (28.1%) their ages between 40- 50, (15.2%) their ages over 50 years. Also the table (5.1.3) shows with respect to the **Educational Qualification** that (51.8%) they got a Bachelor's degree, (8.5%) got a Higher Diploma, (26.8%) got a Master's degree, (10.4%) got a Ph.D., (2.5%) they have other degrees. Concerning the respondents **Specialization** (56.1%) their specialty was accounting, (8.5%) Cost, (6.7%) Business Administration, (4.3%) Economy, (24.4%) they have other specialties. In term of **Job title** (58.5%) were Financial Accountant, (4.9%) were Cost Accountant, (15.2%) were Financial Manager, (3.1%) were General Manager, (18.3%) they were other jobs, the researcher notes the low

proportion of the specialization of cost and management accounting and of those who had a job of cost accountant, although the study is about management accounting, this is due to the lack of interest of the factories of the specialization of management accounting, even worse, most the factories in Sudan do not admit the managerial accounting and a very few factories have a special section of the cost accounting and separate cost accounting for financial accounting. With regard to **Professional qualification** (16.5%) have SCCA, (2.4%) have AFAA, (4.3%) have ACCA, (3.7%) have CPA, (70%) have other Professional qualifications. Regarding the **Years of Experience** (8.5%) have less than 5 years of experience, (36%) have experience between 5-10 years, (43.3%) have experience between 10-15 years, (12.2%) have experience more than 15 years.

The table (5.1.3) shows the firms characteristics ' in term of **Age of the institution** (3.1%) their age less than 5 years, (12.2%) were found between 5-10 years, (18.3%) were found between 10-15 years, (66.4%) their age more than 15 years. Concerning **the markets in which the institution operates** (64.6%) operates in Local markets, (35.4%) operates in regional markets. Regarding to the **Number of users in the foundation** (1.2%) were have less than 50 employees, (1.8%) were have between 50-100 employees, (27.5%) were have between 100-150 employees, (69.5%) were have more than 150 employees. There is a marked decline in the proportion of institutions small size and age, this is because the researcher deliberately distributes the questionnaire in large companies with a long life, this is because large companies need more detail on cost and quality as well as their ability to implement these new systems that need large companies which produce multiple products, in addition to the ability of these companies to compete more than smaller companies. With regard to the **cost system applied by the foundation** (78.1%) of institutions applying Traditional System, (14%) applying ABC system, (1.8%) applying RCA system, (6.1%) applying other systems.

5.1.5 Descriptive Statistics

As far as measurement and validation of research instrument is concerned, before evaluating the psychometric properties of various constructs, it

becomes necessary to describe and understand the descriptive statistics of the sample data. Descriptive statistics examine the accuracy of the data entry process; measures the variability of responses and reveals the spread of data points across the sides of the distribution. The understanding of descriptive statistics helps in the interpretation and generalization of research result.

First, making data cleaning that deals with detecting and removing errors and inconsistencies from data in order to improve the quality of data, And dealing with Missing data that is common and always expected in the process of collecting and entering data due to lack of concentration and/or the misunderstanding among respondents, and missing information or other invalid data during the entry of data. Missing data can cause several problems. The most apparent problem is that there simply won't be enough data points to run the analysis and particularly in structural equation model (SEM). And dealing with Unengaged responses that mean some responses giving the same answer for all the questionnaire it seems to be random answers, in this case, we use standard deviation to find out any unengaged response, this means that any standard deviation of responses less than 0.7 when Likert's five-point scale is used just deleted. Therefore, outliers can influence the results of the analysis. If there is a really high sample size, the need for removing the outliers is wanted, if the analysis running with a smaller dataset, you may want to be less liberal about deleting records. However, outliers will influence smaller datasets more than largest ones. However, in this dataset outliers were checked outliers but not making any change because it is seems logic. There were no any outliers on dataset everything in the dataset is logic. Skewness & Kurtosis We observed fairly normal distribution for our indicator of the latent factor, and for all other variables (e.g..Genderetc.) in terms of skewness. However, we observed mild kurtosis for our variable these kurtosis values ranged benign to 3. While this does violate strict rules of normality, it is within more relaxed rules suggested by Esposito (1983) who recommend 3.3 as the upper threshold for normality. The assessment of descriptive statistics (Table 5.1.3) reveals that all the variables fall within the predefined the important values.

Table (5.1.3) Descriptive Statistics

Code	Mean	Median	Skewness	Std. Error of Skewness	Kurtosis	Std. Error of Kurtosis
Resources-focus 1	1.57	1.00	0.716	0.190	-0.529	0.377
Resources-focus 2	3.99	5.00	-1.242	0.190	0.272	0.377
Resources-focus3	4.09	4.00	-1.369	0.190	1.047	0.377
Resources-focus4	3.92	4.00	-1.190	0.190	0.214	0.377
Resources-focus5	4.06	5.00	-1.364	0.190	0.758	0.377
Resources-focus6	4.32	5.00	10.135	0.190	120.976	0.377
Quantity_structure1	3.99	4.00	-1.279	0.190	0.419	0.377
Quantity_structure2	3.95	4.00	-0.992	0.190	0.224	0.377
Quantity_structure3	3.90	4.00	-1.120	0.190	0.072	0.377
Quantity_structure4	4.11	5.00	-1.038	0.190	1.719	0.377
Nature_of_costs1	4.07	4.00	-1.362	0.190	1.083	0.377
Nature_of_costs2	3.94	4.00	-1.131	0.190	0.514	0.377
Nature_of_costs3	4.02	4.00	-1.279	0.190	0.778	0.377
Nature_of_costs4	3.97	4.00	-0.879	0.190	1.102	0.377
Nature_of_costs5	4.17	5.00	-1.070	0.190	2.369	0.377
Management_commitment1	4.05	5.00	-1.288	0.190	0.525	0.377
Management_commitment2	4.09	5.00	-1.468	0.190	1.097	0.377
Management_commitment3	4.16	5.00	-1.613	0.190	1.742	0.377
Management_commitment4	4.18	4.50	-1.648	0.190	2.064	0.377
Management_commitment5	4.24	5.00	-1.750	0.190	1.994	0.377
Employee_empowerment1	3.87	4.00	-1.160	0.190	0.110	0.377
Employee_empowerment2	4.03	4.00	-1.078	0.190	0.988	0.377
Employee_empowerment3	4.13	4.00	-1.563	0.190	1.655	0.377
Employee_empowerment4	3.84	4.00	-1.098	0.190	0.023	0.377
Employee_empowerment5	4.20	5.00	-1.761	0.190	2.281	0.377
Employee_empowerment6	4.36	5.00	-2.055	0.190	4.217	0.377
Fact_based_decision_making1	4.17	5.00	-1.576	0.190	1.576	0.377
Fact_based_decision_making2	3.82	4.00	-1.059	0.190	-0.176	0.377
Fact_based_decision_making3	3.91	4.00	-1.113	0.190	-0.164	0.377
Fact_based_decision_making4	3.94	4.00	-1.189	0.190	0.307	0.377
Fact_based_decision_making5	4.04	5.00	-1.350	0.190	0.587	0.377
Customer_focus1	3.90	4.00	-1.157	0.190	0.098	0.377
Customer_focus2	3.87	4.00	-1.123	0.190	0.002	0.377
Customer_focus3	3.91	4.00	-1.123	0.190	0.022	0.377

Customer_focus4	3.89	4.00	-1.093	0.190	0.060	0.377
Customer_focus5	4.25	5.00	-1.715	0.190	2.161	0.377
Continuous_Improvement1	4.04	5.00	-1.267	0.190	0.411	0.377
Continuous_Improvement2	4.15	5.00	-1.482	0.190	1.125	0.377
Continuous_Improvement3	4.29	5.00	-1.797	0.190	2.461	0.377
Continuous_Improvement4	4.35	5.00	-1.776	0.190	2.589	0.377
Strategic_Position1	4.29	5.00	-1.796	0.190	2.861	0.377
Strategic_Position2	4.11	5.00	-1.470	0.190	1.075	0.377
Strategic_Position3	4.02	4.00	-1.294	0.190	0.807	0.377
Strategic_Position4	4.09	5.00	-1.400	0.190	0.828	0.377
Strategic_Position5	4.02	4.00	-1.341	0.190	0.740	0.377
Strategic_Position6	3.70	4.00	-0.812	0.190	-1.044	0.377
Value_Chain_Analysis1	4.04	5.00	-1.382	0.190	0.687	0.377
Value_Chain_Analysis2	4.06	5.00	-1.335	0.190	0.654	0.377
Value_Chain_Analysis3	4.00	4.00	-1.261	0.190	0.637	0.377
Value_Chain_Analysis4	3.89	4.00	-1.135	0.190	-0.106	0.377
Value_Chain_Analysis5	4.01	4.00	-1.327	0.190	0.678	0.377
Value_Chain_Analysis6	3.54	4.00	-0.696	0.190	-1.128	0.377
Value_Chain_Analysis7	3.58	4.00	-0.701	0.190	-0.986	0.377
Cost_Drivers_Analysis1	3.93	4.00	-1.176	0.190	0.316	0.377
Cost_Drivers_Analysis2	3.62	4.00	-0.725	0.190	-0.995	0.377
Cost_Drivers_Analysis3	3.81	4.00	-1.014	0.190	-0.382	0.377
Cost_Drivers_Analysis4	3.98	4.00	-1.278	0.190	0.443	0.377
Cost_Drivers_Analysis5	3.96	4.00	-1.248	0.190	0.372	0.377

Source: prepared By Researcher from the field study data 2018

**All items were measured on a 5-point Likert type scale*

Section Two

Data analysis

5.2.0 Introduction

This section concerns Data analysis, reviewing the results of validity and reliability tests, using exploratory factor analysis (EFA) and confirmatory factor analysis (CFA).

5.2.1 Goodness of measures

Validity and reliability tests are being used as a means to assess the goodness of measure in this study constructs (Sekaran, 2003). The study used exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). The following are the detailed information of each;

5.2.1.1 Exploratory factor analysis for Resource Consumption Accounting;

Exploratory Factor Analysis (EFA) is a statistical approach for determining the correlation among variables in a dataset. This type of analysis provides a factor structure (a grouping of variables based on strong correlations). In general, an (EFA) prepares the variables to be used for cleaner structural equation modeling (SEM). This means the (EFA) will be able to spot problematic variables much more easily than the (CFA). Therefore, this study used exploratory factor analysis for testing the validity and unidimensionality of measures to all variables under study, followed the assumptions recommended by (Lowry & Gaskin, 2014) as follow:

(There must be a clean pattern matrix then Adequacy and Convergent validity and Discriminant validity and finally Reliability).

5.2.1.2 Convergent validity

Convergent validity means that the variables within a single factor are highly correlated. This is evident by the factor loadings. Sufficient/significant loadings depend on the sample size of dataset.

5.2.1.3 Discriminant validity

Discriminant validity refers to the extent to which factors are distinct and uncorrelated. The rule is that variables should relate more strongly to their own factor than to another factor. Two primary methods exist for determining discriminant validity during an (EFA): The first method is to examine the rotated component matrix instead of pattern matrix when the principle component used. Variables should load significantly only on one factor. If cross loading does exist (variable loads on multiple factors) then the cross loading should differ by more than (0.2). The second method is to examine the factor correlation matrix. The correlation between factors should not exceed (0.7).

1-Exploratory factor analysis for Resource Consumption Accounting;

We using Maximum Likelihood., the summary of results were shown in Table (5.2.1) and the SPSS output attached in Appendix B3. As shown in Table (5.2.1) below all the remaining items has more than recommended value of at least 0.5 in the measure of sample adequacy (MSA) with (KMO) (above the recommended minimum level of 0.60), and Bartlett's test of sphericity is significant ($p < .01$). Thus, the items are appropriate for factor analysis.

Table (5.2.1) Exploratory Factor Analysis for **Resource Consumption Accounting**

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.812
Bartlett's Test of Sphericity	Approx. Chi-Square	768.874
	Df	28
	Sig.	.000
Resources focus		
The Foundation specifies a comprehensive vision of resources		1.044
The cost accounting system in your foundation uses specific cost centers		.602
Quantity structure		
The causal relationship between resource consumption and cost distribution is determined by quantities		.633
your foundation measures the expected output of resources quantitatively		1.034
Nature of costs		
Your foundation adopts the standard costing system, rather than the actual costing system		.631

The foundation's accounting system uses the replacement cost instead of the historical cost of the depreciation calculation	.908		
your foundation cost system determines unused resources and specifically calculates idle capacity	.682		
A clear distinction is made between the initial costs (costs directly consumed in the production of the intended outputs) and the secondary costs	.717		

Source: prepared By Researcher from the field study data 2018

Variables loaded significantly on factor with Coefficient of at least (0.5), * Items deleted due to high cross loading.

The correlation matrix between the variables of the independent variable (Resource Consumption Accounting) is composed of three axes (The Nature of Cost, Quantity structure, Resources focus) and the number of fourteen items, the analysis resulted in the deletion of a number of statements on some axes. Three components (factors) were obtained from all the terms in the tested Resource Consumption Accounting measure.

The following Table (5.2.2) shows the Discriminant validity.

Table (5.2.2) Discriminant validity of **Resource Consumption Accounting**

Factor	1	2	3
1	1.000		
2	.690	1.000	
3	.577	.482	1.000

Extraction Method: Maximum Likelihood.

Rotation Method: Promax with Kaiser Normalization.

Source: prepared By Researcher from the field study data 2018

2-Exploratory factor analysis for Total Quality Management:

Using Maximum Likelihood., the summary of results was showed in Table (5.2.3) and the SPSS output attached in appendix B3. As shown in Table (5.2.3) below all the remaining items has more than recommended value of at least 0.45 in measure of sample adequacy (MSA) with (KMO) (above the recommended minimum level of (0.60), and Bartlett's test of sphericity is significant ($p < .01$). Thus, the items are appropriate for factor analysis.

Table (5.2.3) Exploratory Factor Analysis for **Total Quality principles**

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.				.875
Bartlett's Test of Sphericity	Approx. Chi-Square			1280.296
	df			66
	Sig.			.000
Management commitment				
Management takes responsibility for quality performance			.829	
The Foundation publishes, disseminates and defines the overall quality policy and its objectives in order to increase the awareness of its employees			.549	
Management uses good performance as an incentive to recruit and retain employees			.588	
There are no communication barriers between departments in the institution			.778	
Fact-based decision making				
your Foundation involves workers in the decision-making in order to adopt and implement it				.625
Quality observations data is used to manage quality initiatives				.704
Customer focus				
We use customer complaints as an input to improve our operations		.923		
our customer satisfaction is linked with internal performance indicators		.929		
We determine the satisfaction of our customers compared to the customer satisfaction of our competitors		.620		
Continuous Improvement				
We emphasize continuous improvement of quality in all business processes				.580
The Foundation makes an effort to prevent errors during the process planning phase				.812
Continuous improvement exceeds short-term results				.843

Source: prepared By Researcher from the field study data 2018

Variables loaded significantly on factor with Coefficient of at least (0.5), * Items deleted due to high cross loading.

The correlation matrix between the variables of the independent variable (Total Quality principles) is composed of five axes (Management

commitment, Employee empowerment, Fact-based decision making, Customer focus, Continuous Improvement) and the number of twenty five items, the analysis resulted in the deletion of a number of statements on some axes. Four components (factors) were obtained from all the terms in the tested Total Quality principles measure.

The following Table (5.2.4) shows the Discriminant validity.

Table (5.2.4) Discriminant validity of Total Quality principles

Factor	1	2	3	4
1	1.000			
2	.494	1.000		
3	.574	.565	1.000	
4	.676	.512	.499	1.000

Extraction Method: Maximum Likelihood.

Rotation Method: Promax with Kaiser Normalization.

Source: prepared By Researcher from the field study data 2018

3-Exploratory factor analysis for Strategic Cost Management

Using Maximum Likelihood., the summary of results was showed in Table (5.5) and the SPSS output attached in appendix B3. As shown in Table (5.2.5) below all the remaining items has more than recommended value of at least 0.45 in measure of sample adequacy (MSA) with (KMO) (above the recommended minimum level of 0.60), and Bartlett's test of sphericity is significant ($p < .01$). Thus, the items are appropriate for factor analysis.

Table (5.2.5) Exploratory Factor Analysis for **Strategic Cost Management**

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.865
Bartlett's Test of Sphericity	Approx. Chi-Square	854.150
	Df	28
	Sig.	.000
Strategic Position		
The capabilities and possibilities of the company are determined		.691
There is an analysis of the internal and external environment of the foundation		.643
The strengths and weaknesses of the foundation are analyzed		.942
Value Chain Analysis		

The relationship between activities is determined			.521
The foundation determines activities that add value and which do not add value			.993
Cost Drivers Analysis			
There are management relationships between the company and both suppliers and customers	.819		
The foundation converts operations to specific activities	.794		
The foundation determines the cost of each activity	.863		

Source: prepared By Researcher from the field study data 2018

Variables loaded significantly on factor with Coefficient of at least (0.5), *
Items deleted due to high cross loading.

The correlation matrix between the variables of the dependent variable (Strategic Cost Management) is composed of three axes (Strategic Position, Value Chain Analysis, Cost Drivers Analysis) and the number of eighteen items, the analysis resulted in the deletion of a number of statements on some axes. Three components (factors) were obtained from all the terms in the tested Strategic Cost Management measure.

The following Table (5.2.6) shows the Discriminant validity;

Table (5.2.6) Discriminant validity of Strategic Cost Management

Factor	1	2	3
1	1.000	.650	.643
2	.650	1.000	.557
3	.643	.557	1.000

Extraction Method: Maximum Likelihood.

Rotation Method: Promax with Kaiser Normalization.

Source: prepared By Researcher from the field study data 2018

5.2.1.4 Reliability

Reliability is a one of the basic psychometric requirement of scale validity. Reliability is concerned with the ability of an instrument to produce similar result, time and again under the assumption that group of respondents and prevailing conditions remain same. It reflects the degree to which an instrument is free from random error and consistently measures the underlying construct with reasonable accuracy (Churchill, 1979; Leedy and

Ormrod, 2001; Yang et al., 2007; Hair et al. 2008). Internal consistency is an important aspect of reliability. It describes the extent to which the different scale items of a same construct correlate with one another. A higher degree of internal consistency, not only proves the convergence of scale items towards the common definition of underlying construct but it also affirms the claim that amount of variance captured by a scale is significantly higher to the amount of error variances i.e. random error in a scale. Random error is assessed by squaring the inter-item correlation and subtracting the same from (1.00). As the estimate of reliability increases, the fraction of a test score that can be attributed to random error decreases.

Cronbach alpha is one of the most popular methods for assessing internal consistency (Churchill, 1979; Peter, 1981). Closer the Cronbach's alpha to 1, higher the internal consistency. In general, the reliabilities less than (0.70) indicates a poor estimate of observed variance i.e. amount of error variance in the test score is relatively higher to the observed variance. In context of the present study, reliability of the various constructs has been assessed through Cronbach's alpha.

The value of Cronbach's alpha for all the constructs Table (5.2.7) are above the threshold limit of (0.60).

Table (5.2.7) Cronbach's Alpha for Study Variables

Construct	Variables	Number of items	Cronbach's alpha
Resource Consumption Accounting	Nature of costs	4	.806
	Quantity structure	2	.838
	Resources focus	2	.776
Total Quality principles	Customer focus	3	.873
	Management commitment	4	.802
	Continuous Improvement	3	.801
	Fact based decision making	2	.714
Strategic Cost Management	Cost Drivers Analysis	3	.843
	Strategic Position	3	.800
	Value Chain Analysis	2	.780

Source: prepared By Researcher from the field study data 2018

5.2.1.5 Confirmatory factor analysis (CFA)

CFA is a multivariate data analysis technique that examines and confirms how well the observed variables estimate or reflect fewer factors (latent constructs) that can't be estimated directly (Hair et al., 2009). Contrary to EFA, CFA is a technique with a confirmatory character and addresses the situation when a researcher specifies a model a priori and tests the conjecture that a relationship between the observed and the latent variables does in fact exist. In the case of CFA, the researcher has a good knowledge of the number of factors that explains the inter-correlations between observed variables. EFA examine the validity of the measurement model which is the operationalization of latent constructs by sets of measured variables. Assessing measurement model validity includes the following steps which are commonly used in literature (e.g., Hair et al., 2009; Liu et al., 2009; Rokkan et al., 2003).

- Examination of the measurement model's overall fit (whether our data fit the hypothesized model well).

- Examinations of the measurement models construct validity. Construct validity is assessed through:

- * Convergent validity: According to convergent validity, the measured variables of a latent construct should share a high proportion of variance and is estimated through; Factor loadings, Variance extracted, Construct reliability.

- * Discriminant validity. It helps us examine whether latent constructs which according to the theory shouldn't be correlated, are indeed uncorrelated according to our data. Thus, with discriminant validity, we examine the degree of differentiation between latent constructs.

5.2.2 Validity

The validity of the various constructs of interest has been examined by employing Campbell and Fiske criteria of validity. Campbell & Fiske (1959) proposed two aspects of construct validity: convergent and divergent validity. Convergent validity is the degree to which multiple attempts to

measure the same concept are in agreement. Whereas, discriminant or divergent validity examines the extent to which group of items representing a specific construct-differentiate, that construct from another set of items-representing some other distinct construct (Bagozzi et al., 1991).

The convergent validity has often been assessed by looking at the standardized factor loadings (SFL), average variance extracted (AVE) and composite reliability (CR). SFL reflect the amount of explained variance by an indicator in accordance to the underlying construct (Hair et al., 2008; Markus, 2012; Byrne, 2013). Loading of (0.5) or more confirms the convergence of scale item i.e. the indicator is strongly related with its associated construct (Bagozzi et al., 1991; Hair et al., 2008; Byrne, 2013). AVE provides the summary of overall convergence of a scale and reflects the average communality (Fornell and Larker, 1981) i.e. the variance captured by an instrument through all its items. An AVE of less than (0.5) indicates that, on average, more error (i.e. systematic error) remains in measure than variance explained by the latent factor structure (Hair et al., 2008), whereas a score of more than (0.5) affirms the higher amount of explained variance. CR indicates the internal consistency of the instrument. Any value of (0.70) or higher affirms high degree of internal consistency between different scale items.

Divergent validity tests whether the concepts that are supposed to be unrelated are, in fact, unrelated. It is generally examined through the comparison of the AVE score with the squared correlations of respective constructs. A lower index of shared variance (squared correlation) between each pair of constructs against the minimum of the AVEs of both of the concerned constructs affirms the divergent validity of the underlying constructs (Fornell and Larker, 1981). The logic here is based on the idea that if two or more concepts are unique, then valid measures of each should not correlate too highly (Bagozzi et al., 1991).

In the context of the present study, the convergent and divergent validity of different constructs has been examined during the validation of measurement models. Confirmatory Factor Analysis (CFA) has been utilized to estimate measurement adequacy (Hair et al., 1998). In the context of the scale

development and validation, recent literature (e.g. Rentz et al.,2002) affirms the superiority of CFA over Exploratory Factor Analysis. To assess the fit between theory and reality, CFA rather concentrating on a single index, often rely upon numerous fit indices like: Normed Chi-square index, Goodness-of-fit index (GFI), Adjusted goodness-of-fit index (AGFI), Root mean square residual (RMR) and Root mean square error of approximation (RMSEA) – as indicators of absolute fit indices (Hu and Bentler, 1995; MacCallum et al., 1996; Steiger, 2007); Comparative Fit Index (CFI), Tucker-Lewis index (TLI), and Normed fit index (NFI) – as indicators of incremental fit indices (Bentler and Bonnet, 1980; Mulaik et al, 1989; Bentler, 1990; Hu and Bentler, 1995; Kline, 2005; Tabachnick and Fidell, 2007); Parsimony goodness-of-fit index (PGFI) and Parsimony Normed fit index (PNFI) – as indicators of parsimony fit indices. In contrast, these fit statistics are generally not available in standard methods of Exploratory Factor Analysis. A careful consideration is that assessing a measurement model through numerous fit indices is more parsimony approach than one with absolute or single criteria (Hair et al., 1998).

In the context of the present study, following criteria Table (5.2.8) has been adopted for the measurement and validation of various constructs:

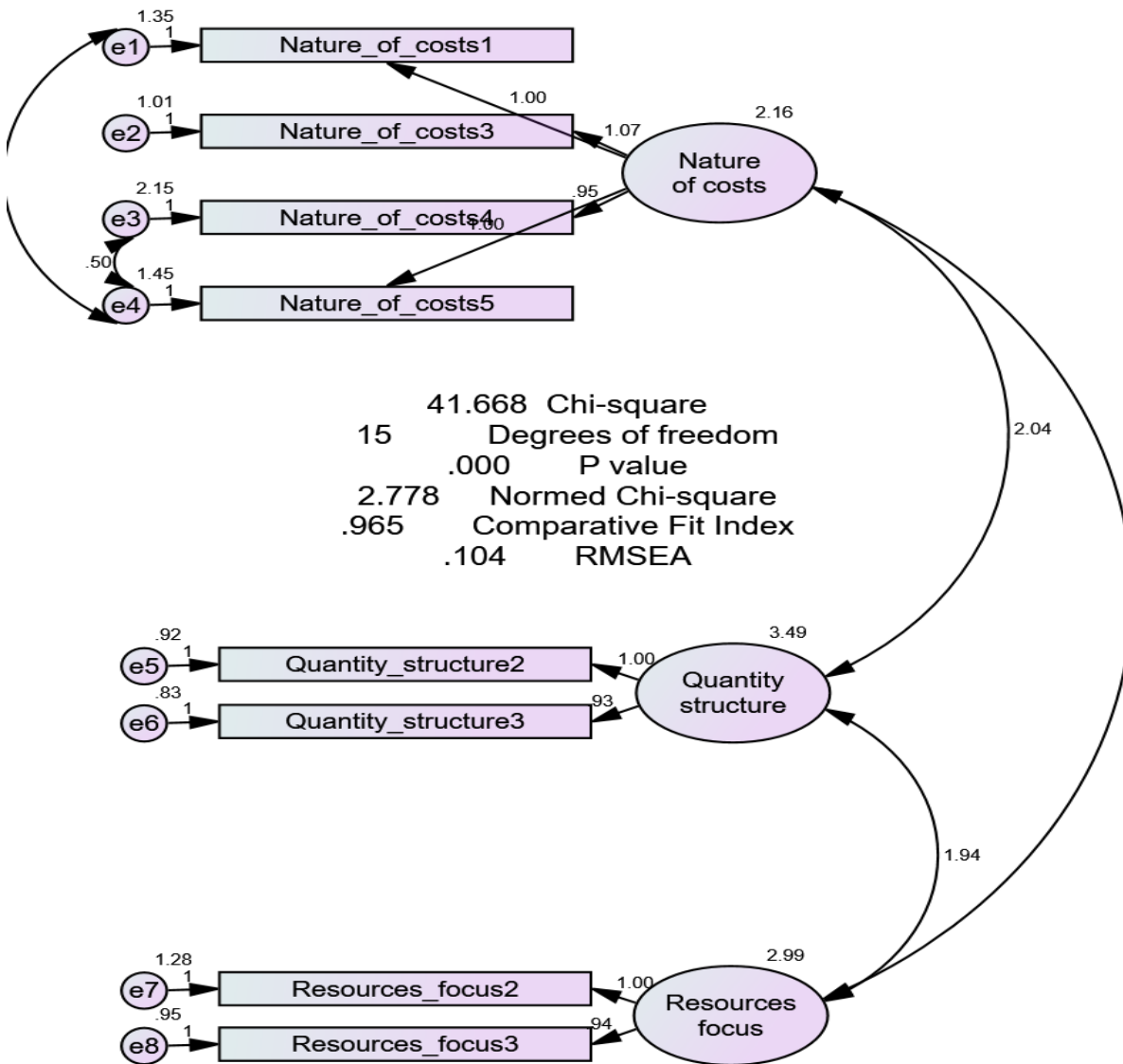
Table (5.2.8) Criteria

S.No.	Parameter	Criteria
1	Normed Chi-square (ratio of Chi-square to degrees of freedom)	Less than 3
2	Goodness-of-Fit Index (GFI)	At least .90
3	Adjusted Goodness-of-Fit Index (AGFI)	At least .90
4	Normed Fit Index (NFI)	At least .90
5	Comparative Fit Index (CFI)	At least .90
6	Root Mean Square Residual (RMR)	Less than .10
7	Root Mean Square Error of Approximation (RMSEA)	Less than .08
8	Standardized Residuals	Less than 2.5
9	Standardized factor loadings (SFL)	At least .50
10	Average Variance Extracted (AVE)	At least .50
11	Composite Reliability (CR)	At least .70

1-Measurement and Validation of Resource Consumption Accounting

To assess the degree of correspondence between the manifest variables and latent construct of (Resource Consumption Accounting) a uni-dimensional CFA model Figure (5.2.1) has been conceptualized and tested for its psychometric properties. The result of CFA shows in Table (5.2.9).

Figure (5.2.1) Resource Consumption Accounting



Source: prepared By Researcher from the field study data 2018

Figure (5.2.1) shows Confirmatory Factor Analysis (CFA) is the next step after exploratory factor analysis to determine the factor structure of your dataset. In the EFA we explore the factor structure (how the variables relate and group based on inter-variable correlations); in the CFA we confirm the factor structure we extracted in the EFA, **the structural model of Confirmatory Factor Analysis (CFA) reveals the same measures that can be calculated to determine goodness of fit show in Table (5.2.9)**

Table (5.2.9) Model Fit Indices of **Resource Consumption Accounting**

Measure	Estimate	Threshold	Interpretation
CMIN	31.734	--	--
DF	15	--	--
CMIN/DF	2.116	Between 1 and 3	Excellent
CFI	0.970	>0.95	Excellent
SRMR	0.043	<0.08	Excellent
RMSEA	0.083	<0.06	Terrible
PClose	0.086	>0.05	Excellent

Source: prepared By Researcher from the field study data 2018

Unfortunately, your model fit could improve.

The convergent validity of the construct of **Resource Consumption Accounting** has been assessed through standardized factor loadings, AVE and CR. Table (5.2.10) reveals that standardized factor loadings for all items were above the suggested cut-off of 0.50 (Hatcher, 1994), with a minimum of 0.65, and were all significant at 1% level of significance. The AVE of 0.619 meets the criterion of .50. High score of CR (i.e. 0.918) confirms the internal consistency of the scale items.

Table (5.2.10) Psychometric Properties of **Resource Consumption Accounting**

	CR	AVE	MSV	ASV			
Quantity structure	0.732	0.724	0.567	0.440	0.851		
Nature of	0.732	0.518	0.567	0.458	0.753	0.720	

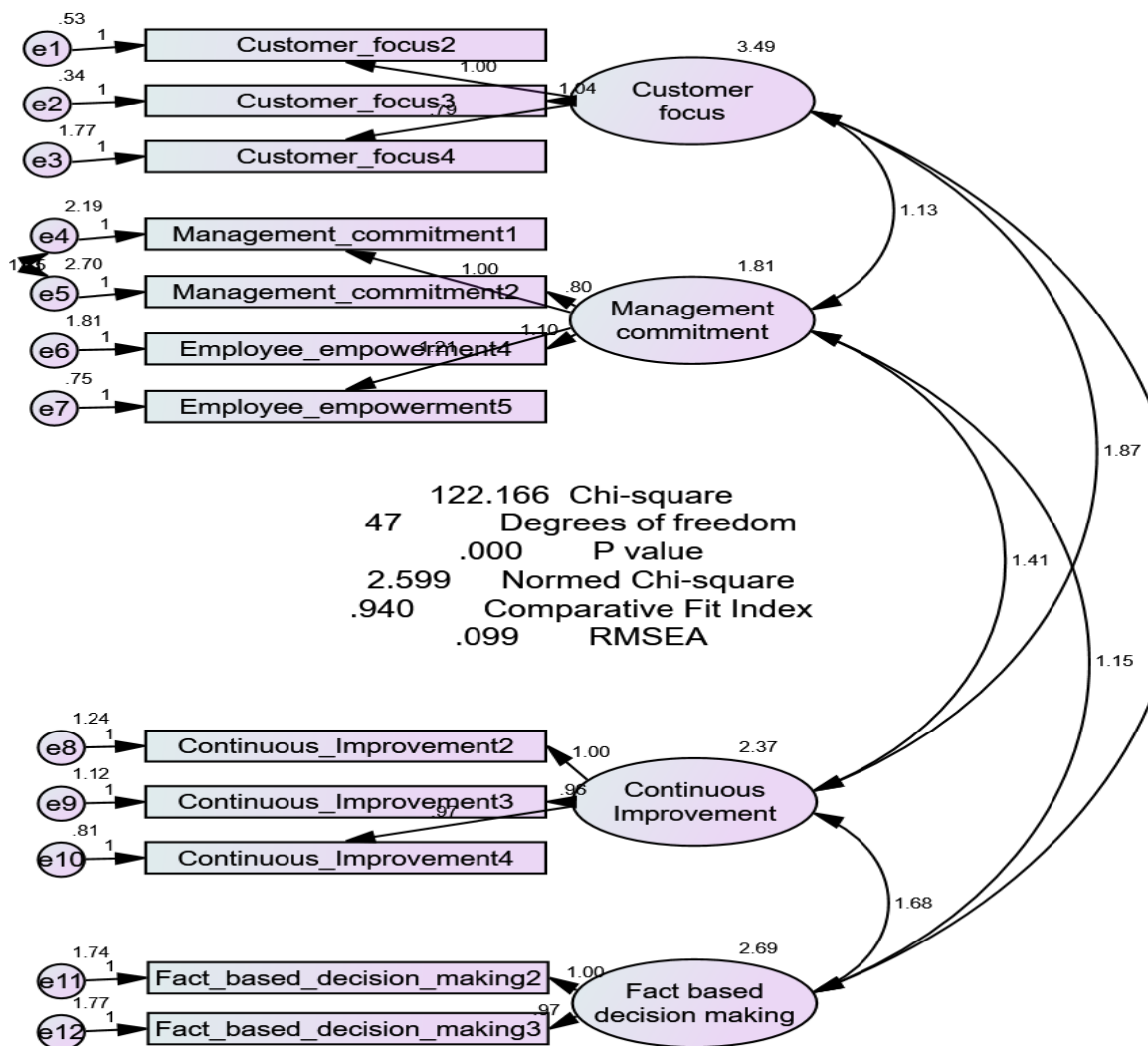
costs							
Resources	0.690	0.639	0.348	0.331	0.560	0.590	0.800
focus							

Source: prepared By Researcher from the field study data 2018

2-Measurement and Validation of Total Quality

To assess the degree of correspondence between the manifest variables and latent construct of (Total Quality) a uni-dimensional CFA model Figure (5.2.2) has been conceptualized and tested for its psychometric properties. The result of CFA shows in Table (5.2.11).

Figure (5.2.2) Total Quality CFA



Source: prepared By Researcher from the field study data 2018

Figure (5.2.2) shows Confirmatory Factor Analysis (CFA) is the next step after exploratory factor analysis to determine the factor structure of your dataset. In the EFA we explore the factor structure (how the variables relate and group based on inter-variable correlations); in the CFA we confirm the factor structure we extracted in the EFA, the structural model of Confirmatory Factor Analysis (CFA) reveals the same measures that can be calculated to determine goodness of fit show in Table (5.2.11).

Table (5.2.11) Model Fit Indices of Total Quality

Measure	Estimate	Threshold	Interpretation
CMIN	115.264	--	--
DF	47	--	--
CMIN/DF	2.452	Between 1 and 3	Excellent
CFI	0.934	>0.95	Acceptable
SRMR	0.090	<0.08	Acceptable
RMSEA	0.094	<0.06	Terrible
PClose	0.001	>0.05	Terrible

Source: prepared By Researcher from the field study data 2018

Unfortunately, your model fit could improve.

The convergent validity of the construct of **Total Quality** has been assessed through standardized factor loadings, AVE and CR. Table (5.2.12) reveals that standardized factor loadings for all items were above the suggested cut-off of (0.50) (Hatcher, 1994), with a minimum of (0.65), and were all significant at 1% level of significance. The AVE of (0.619) meets the criterion of (0.50). High score of CR (i.e. 0.918) confirms the internal consistency of the scale items.

Table (5.2.12) Psychometric Properties of **Total Quality**

	CR	AVE	MSV	ASV				
Continuous Improvement	0.765	0.577	0.468	0.431	0.760			
Customer focus	0.813	0.718	0.468	0.349	0.624	0.847		

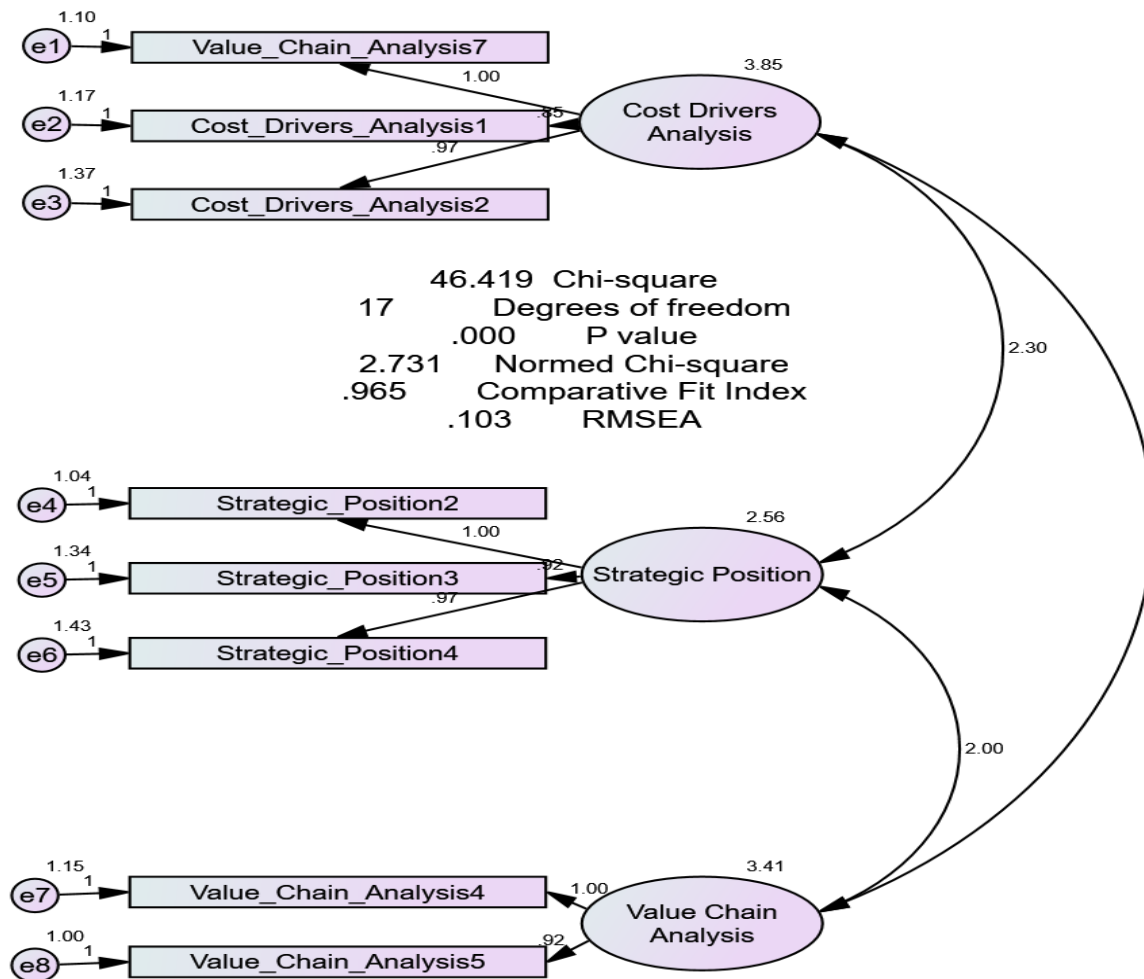
Management commitment	0.731	0.521	0.468	0.375	0.684	0.436	0.722	
Fact based decision making	0.575	0.572	0.468	0.456	0.659	0.684	0.683	0.756

Source: prepared By Researcher from the field study data 2018

3- Measurement and Validation of Strategic Cost Management

To assess the degree of correspondence between the manifest variables and latent construct of (Resource Consumption Accounting) a uni-dimensional CFA model Figure (5.2.3) has been conceptualized and tested for its psychometric properties. The result of CFA shows in Table (5.2.13).

Figure (5.2.3) Strategic Cost Management



Source: prepared By Researcher from the field study data 2018

Figure (5.2.3) show Confirmatory Factor Analysis (CFA) is the next step after exploratory factor analysis to determine the factor structure of your dataset. In the EFA we explore the factor structure (how the variables relate and group based on inter-variable correlations); in the CFA we confirm the factor structure we extracted in the EFA, the structural model of Confirmatory Factor Analysis (CFA) reveals the same measures that can be calculated to determine goodness of fit show in Table (5.2.13).

Table (5.2.13) Model Fit Indices of **Strategic Cost Management**

Measure	Estimate	Threshold	Interpretation
CMIN	36.510	--	--
DF	17	--	--
CMIN/DF	2.148	Between 1 and 3	Excellent
CFI	0.970	>0.95	Excellent
SRMR	0.041	<0.08	Excellent
RMSEA	0.084	<0.06	Terrible
PClose	0.068	>0.05	Excellent

Source: prepared By Researcher from the field study data 2018

Unfortunately, your model fit could improve.

The convergent validity of the construct of **Strategic Cost Management** has been assessed through standardized factor loadings, AVE and CR. Table (5.2.14) reveals that standardized factor loadings for all items were above the suggested cut-off of (0.50) (Hatcher, 1994), with a minimum of (0.65), and were all significant at 1% level of significance. The AVE of (0.619) meets the criterion of (0.50). High score of CR (i.e. 0.918) confirms the internal consistency of the scale items.

Table (5.2.14) Psychometric Properties of **Strategic Cost Management**

	CR	AVE	MSV	ASV			
Strategic Position	0.726	0.574	0.542	0.532	0.758		

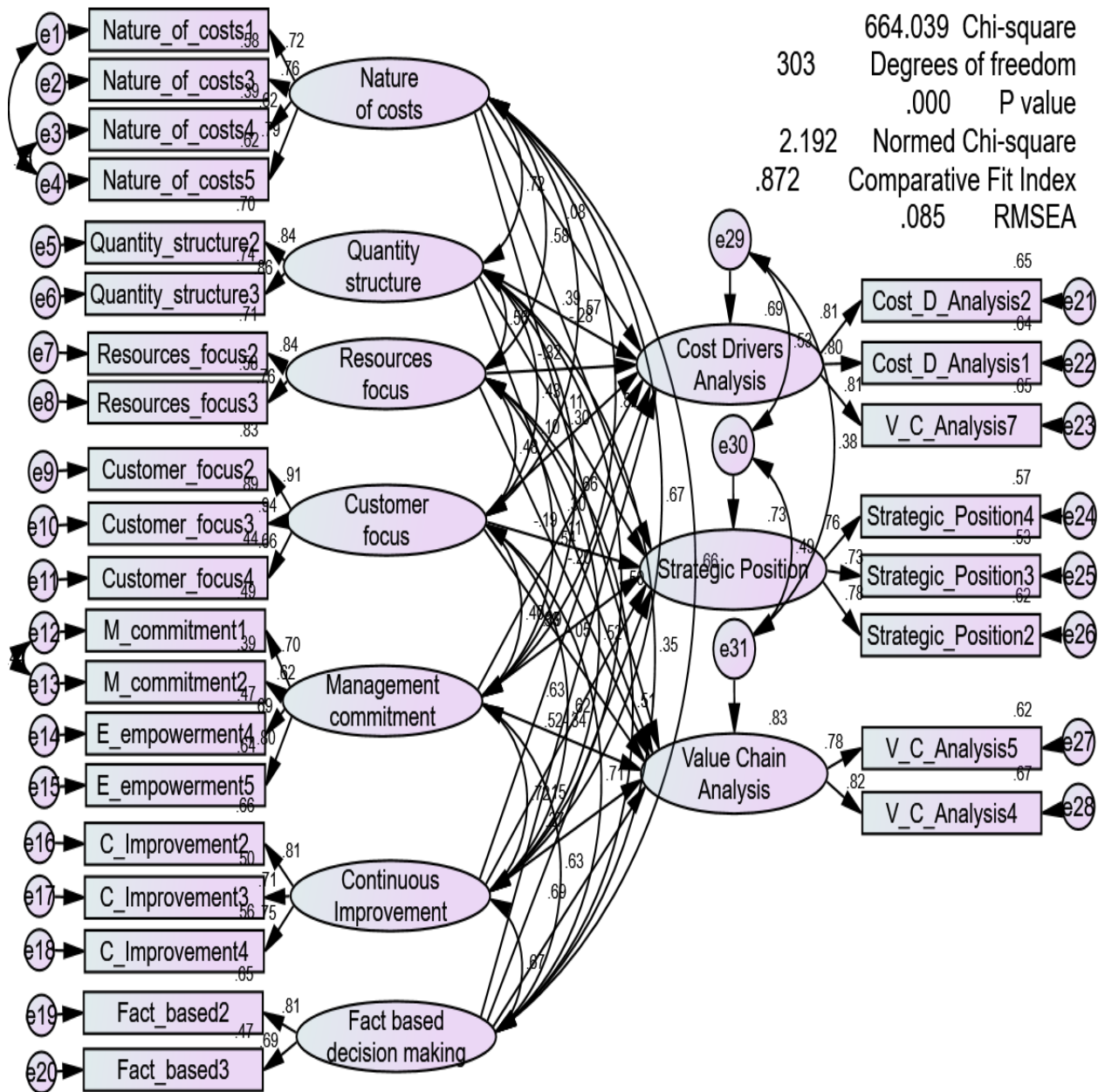
Cost Drivers Analysis	0.732	0.646	0.679	0.601	0.723	0.804	
Value Chain Analysis	0.674	0.647	0.679	0.610	0.736	0.824	0.805

Source: prepared By Researcher from the field study data 2018

4-Modified of Research Framework and hypotheses

From the result of the factor analysis, the whole previous conceptual framework had been changed

Figure (5.2.4)



Source: prepared By Researcher from the field study data 2018

Table (5.2.15) Model fit after modification the research model

Measure	Estimate	Threshold	Interpretation
CMIN	664.039	--	--
DF	303	--	--
CMIN/DF	2.192	Between 1 and 3	Excellent
CFI	0.872	>0.95	Need More DF
SRMR	0.064	<0.08	Excellent
RMSEA	0.085	<0.06	Terrible
PClose	0.000	>0.05	Terrible

Source: prepared By Researcher from the field study data 2018

Unfortunately, your model fit could improve.

Based on the modified theoretical framework, the hypotheses related to all dimensions need to be restated. The restated hypotheses reflect the addition of new variables and the eliminated ones related to the constructs. The restated hypotheses are shown in the table (5.2.16).

Table (5.2.16) The restated hypotheses

<p>The first main hypothesis:</p> <p>H1: There is a statistically significant relationship between the application of RCA and strategic cost management.</p> <p>Branching out of it the following hypothesizes;</p> <p>H1.1: The first Sub-hypothesis: There is a statistically significant relationship between application of resource consumption accounting and Value Chain Analysis. Branching out of it the following;</p> <p>H1.1a: There is a statistically significant relationship between The Nature of Cost and Value chain Analysis.</p> <p>H1.1b: There is a statistically significant relationship between Quantity structure and Value Chain Analysis.</p> <p>H1.1c: There is a statistically significant relationship between Resources</p>
--

focus and Value Chain Analysis.

H1.2: There is a statistically significant relationship between application of resource consumption accounting and Cost Driver Analysis. Branching out of it the following;

H1.2a: There is a statistically significant relationship between The Nature of Cost and Cost Driver Analysis.

H1.2b: There is a statistically significant relationship between Quantity structure and Cost Driver Analysis.

H1.2c: There is a statistically significant relationship between Resources focus and Cost Driver Analysis.

H1.3: There is a statistically significant relationship between application of resource consumption accounting and Strategic Positioning. Branching out of it the following;

H1.3a: There is a statistically significant relationship between The Nature of Cost and Strategic Positioning.

H1.3b: There is a statistically significant relationship between Quantity structure and Strategic Positioning.

The Second main hypothesis:

H2: There is a statistically significant relationship between the application of Total Quality Principles and strategic cost management.

Branching out of it the following hypothesizes;

H2.1: The first Sub-hypothesis: There is a statistically significant relationship between application of Total Quality Principles and Value chain. Branching out of it the following;

H2.1a: There is a statistically significant relationship between application of Continuous Improvement and Value chain.

H2.1b: There is a statistically significant relationship between application of Customer focus and Value chain.

H2.1c: There is a statistically significant relationship between application of Management commitment and Value chain.

H2.1d: There is a statistically significant relationship between application of Fact based decision making and Value chain.

H2.2: There is a statistically significant relationship between application of Total Quality Principles and Cost Driver. Branching out of it the following;

H2.2a: There is a statistically significant relationship between application of Continuous Improvement and Cost Driver.

H2.2b: There is a statistically significant relationship between application of Customer focus and Cost Driver.

H2.2c: There is a statistically significant relationship between application of Management commitment and Cost Driver.

H2.2d: There is a statistically significant relationship between application of Fact based decision making and Cost Driver.

H2.3: There is a statistically significant relationship between application of Total Quality Principles and Strategic Positioning. Branching out of it the following;

H2.3a: There is a statistically significant relationship between application of Continuous Improvement and Strategic Positioning.

H2.3b: There is a statistically significant relationship between application of Customer focus and Strategic Positioning.

H2.3c: There is a statistically significant relationship between application of Management commitment and Strategic Positioning.

H2.3d: There is a statistically significant relationship between application of Fact based decision making and Strategic Positioning.

The Third main hypothesis:

H3: There is a positive relationship between the integration of Total Quality Principles and resource consumption accounting on strategic cost management.

Branching out of it the following hypothesizes;

H3.1: There is a positive relationship between the integration of customer focus and resource consumption accounting on strategic cost management

H3.2: There is a positive relationship between the integration of Management commitment and resource consumption accounting on strategic cost management.

H3.3: There is a positive relationship between the integration of Continuous Improvement and resource consumption accounting on strategic cost management.

H3.4: There is a positive relationship between the integration of Fact based decision making and resource consumption accounting on strategic cost

5.2.3 Model Fit and hypotheses testing

The fit index statistic tests the consistency between the predicted and observed data matrix by the equation (Keith, T, 2006). One of the differences that exist between the SEM technique and regression method is that the former one does not have any single statistical test applicable for evaluation of model predictions “strength” (Hair, J.F., et al,1988). In this regard, Kline (Kline, R.B, 1988) believed that there are “dozens of fit indexes described in SEM literature, more than any single model-fitting program reports”. However, according to Hair, Black (Hair, J.F., et al,1988) and Garson (Garson, G.D, et al 2007), the chi-square fit index, also known as chi-square discrepancy test, is considered as the most fundamental and common overall fit measure. Thus, in a good model fit the value of chi-square should not be very significant, i.e., $p > 0.05$ (Hair, J.F., et al,1988). However, one problem usually experienced through this test relates to the rejection probability of the model having direct interaction with the sample size. Moreover, the sensitivity level of chi-square fit index is very high, especially, towards the multivariate normality assumption violations (Garson, G.D, et al 2007).

Many indexes have been introduced and developed to avert or reduce the problems related to the chi-square fit index. Some of the indexes included in the absolute fit indexes are as follows:

a) "Normal Chi-Square Fit Index" (CMIN/DF):

Normal chi-square fit index, χ^2/df , serves to adjust the testing of chi-square according to the sample size (Byrne, B.M 2007). A number of researchers take 5 as an adequate fit value, while more conservative researchers believe that chi-square values larger than 2 or 3 are not acceptable (Garson, G.D, et al 2007).

b) "Goodness-of-Fit Index"[30]:

GFI is utilized for gauging the discrepancy level between the estimated or predicted covariance and resulted or observed ones (Jöreskog, K.G,1993).

$$GFI = 1 - [\max[(\chi^2 - df)/n, 0] / \max[(\chi_{null}^2 - df_{null})/n, 0]]$$

The allowable range for GFI is between 0 and 1, where 1 indicates a perfect fit, which demonstrates that measures equal to or larger than 0.90 signify a 'good' fit (Garson, G.D, et al 2007).

a) *Adjusted Goodness-of-Fit Index*"(AGFI) (Jöreskog, K.G.,1993):

AGFI is utilized for adjustment of the GFI relating the complexity of the model.

$$AGFI = 1 - [(1 - GFI) d_{null} /]$$

The measuring of AGFI is between 0 and 1, in which 1 or over 1 (AGFI>1.0) signifies a perfect fit, nevertheless, it cannot be bounded below 0, i.e., (AGFI<0). As in the case of GFI, AGFI values equal to or bigger than 0.90 signify a 'good' fit (Garson, G.D, et al 2007).

b) *"Root Mean Square Residual"* (RMR):

RMR shows the mean squared amount's square root, which distinguishes the sample variances and covariances from the corresponding predicted variances and covariances (Hu, L. and P.M. Bentler,1995). The assessment relies on an assumption that considers the model to be correct. The smaller the RMR, the more optimal the fit is [Garson, G.D, et al 2007].

c) *"Root Mean Square Error of Approximation"* (RMSEA) (Steiger, J.H 1990):

RMSEA is employed to gauge the approximation error in the population.

$$RMSEA = [(\chi^2 - df) / (n - 1) df]^{1/2}$$

In cases where the RMSEA value is small, the approximation is believed to be optimal. An approximately 0.05 or smaller value of RMSEA means a more appropriate and closer model fit in connection with the degrees of freedom. Nevertheless, between 0.05 and 0.08 displays the most preferable status and the more optimal fit results (Browne, M.W. and R. Cudeck 1970).

In addition, the following indexes are also included in the incremental fit measures:

a) "*Normed Fit Index or Bentler Bonett Index*" (NFI):

Normed Fit Index or Bentler Bonett Index or NFI is applicable to contrast and compare the fit of a suggested model against a null model (Bentler, P.M. and D.G. Bonett,1980).

$$NFI = [\chi^2 / (NullModel) \chi^2 // df(ProposedModel) / [\chi^2 / df(NullModel) - 1]$$

This index defines all the observed variables as uncorrelated. The values of NFI range between 0 and 1, where 0.90 signifies an optimal fit (Garson, G.D, et al 2007).

a) "*Tucker Lewis Index or Non-Normed Fit Index*" (TLI or NNFI):

The TLI or NNFI index is used to gauge parsimony, which is applicable through the evaluation and assessment of the degrees of freedom of the suggested model to the degrees of freedom of the null model (Bentler, P.M. and D.G. Bonett,1980) .

$$NFI = [\chi^2 / (NullModel) \chi^2 // df(ProposedModel) / [\chi^2 / df(NullModel) - 1]$$

However, it is not certain whether TLI can vary from 0 to 1. A fit of model is required to possess a TLI that is larger than 0.90 (Bentler, P.M. and D.G. Bonett,1980, Tucker, L.R. and C. Lewis 1970).

b) "*Comparative Fit Index*" (CFI) (Bentler, P.M.,1998):

CFI is not only less affected by the sample size, but also based on comparison of the hypotheses sized model to the null model (Kline, R.B,1998).

$$CFI = 1 - [\max[(\chi^2 - df), 0] \max[(\chi^2 - df), (\chi_{null}^2 - df_{null}), 0]]$$

The values of CFI range between 0 and 1. However, its values need to be a minimum of 0.90 to be usable for a model fit (Garson, G.D, et al 2007).

5.2.4 Descriptive Statistics of Variables

In this section descriptive statistics such as mean and standard deviation was used to describe the characteristics of surveyed to all variables (Independent, dependent, and mediators) under study. Table (5.2.17) shows the means and standard deviations.

Table (5.2.17) Descriptive Statistics to all variables:

	Mean	Std. Deviation
Resources focus	1.57	.656
Quantity structure	3.99	1.329
Nature of costs	4.07	1.178
Management commitment	4.05	1.272
Fact based decision making	4.17	1.196
Customer focus	3.90	1.349
Continuous Improvement	4.04	1.296
Strategic Position	4.29	1.033
Value Chain Analysis	4.04	1.312
Cost Drivers Analysis	3.93	1.278

Source: prepared By Researcher from the field study data 2018

Note: All variables used a 5-point likert scale (1= strongly disagree, 5= strongly agree)

Table (5.2.17) shows the means and standard deviations of all variables in framework: Determinants of entrepreneurial intentions. The table reveals that Strategic Position is the highest mean value (mean=4.29, standard deviation=1.033) this indicated that the food industrial companies gives the matter of Strategic Position more attention, the lowest mean value followed by Resources focus (mean=1.57, standard deviation=.656) This mean value provided evidence that more focus and more work needs to be done to improve the resources of food industrial companies.

5.2.5 Correlation Analysis

Table (5.2.19) presents the results of the inter correlation among the variables. The correlation analysis was conducted to see the initial picture of the interrelationships among the variables under the study. Therefore, the importance of conducting correlation analysis is to identify any potential problems associated with multicollinearity (Sekaran, 2000). Table (5.2.18) represents the correlation matrix for the constructs operationalized in this

study. These bivariate correlations allow for preliminary inspection and information regarding hypothesized relationships. In addition to that, correlation matrix gives information regarding test for the presence of multicollinearity. The table shows that no correlations near 1.0 (or approaching 0.8 or 0.9) were detected, which indicate that multicollinearity is not a significant problem in this particular data set.

Table (5.2.18) Correlations to all variables in models

		Estimate
Nature_of_costs	<--> Quantity_structure	.749
Nature_of_costs	<--> Resources_focus	.577
Quantity_structure	<--> Resources_focus	.553
Customer_focus	<--> Management_commitment	.438
Customer_focus	<--> Continuous_Improvement	.624
Customer_focus	<--> Fact_based_decision_making	.698
Management_commitment	<--> Continuous_Improvement	.690
Management_commitment	<--> Fact_based_decision_making	.680
Continuous_Improvement	<--> Fact_based_decision_making	.668
Nature_of_costs	<--> Customer_focus	.561
Nature_of_costs	<--> Management_commitment	.853
Nature_of_costs	<--> Continuous_Improvement	.674
Nature_of_costs	<--> Fact_based_decision_making	.637
Quantity_structure	<--> Customer_focus	.426
Quantity_structure	<--> Management_commitment	.651
Quantity_structure	<--> Continuous_Improvement	.503
Quantity_structure	<--> Fact_based_decision_making	.351
Resources_focus	<--> Customer_focus	.484
Resources_focus	<--> Management_commitment	.536
Resources_focus	<--> Continuous_Improvement	.505
Resources_focus	<--> Fact_based_decision_making	.498
Nature_of_costs	<--> Cost_Drivers_Analysis	.623
Nature_of_costs	<--> Strategic_Position	.616
Nature_of_costs	<--> Value_Chain_Analysis	.745
Quantity_structure	<--> Cost_Drivers_Analysis	.504
Quantity_structure	<--> Strategic_Position	.504
Quantity_structure	<--> Value_Chain_Analysis	.545
Resources_focus	<--> Cost_Drivers_Analysis	.323
Resources_focus	<--> Strategic_Position	.534
Resources_focus	<--> Value_Chain_Analysis	.441
Customer_focus	<--> Cost_Drivers_Analysis	.643
Customer_focus	<--> Strategic_Position	.569

		Estimate
Customer_focus	<--> Value_Chain_Analysis	.678
Management_commitment	<--> Cost_Drivers_Analysis	.514
Management_commitment	<--> Strategic_Position	.683
Management_commitment	<--> Value_Chain_Analysis	.628
Continuous_Improvement	<--> Cost_Drivers_Analysis	.624
Continuous_Improvement	<--> Strategic_Position	.815
Continuous_Improvement	<--> Value_Chain_Analysis	.717
Fact_based_decision_making	<--> Cost_Drivers_Analysis	.724
Fact_based_decision_making	<--> Strategic_Position	.647
Fact_based_decision_making	<--> Value_Chain_Analysis	.828
Cost_Drivers_Analysis	<--> Strategic_Position	.722
Cost_Drivers_Analysis	<--> Value_Chain_Analysis	.831
Strategic_Position	<--> Value_Chain_Analysis	.743

Source: prepared By Researcher from the field study data 2018

As shown in table (5.2.18) above the correlation analysis provides strong indicators of associations, thus for more examination of the proposed relationships path analysis through structural equation model (SEM) was conducted to gives the best predictive model of the relationship present among the variables.

Section Three

Test hypotheses

5.3.0 Introduction

This section concerns hypotheses testing; accordingly more examination of the proposed relationships path analysis was conducted through structural equation model to give the best predictive model of the relationship between the variables. Thus this section reviews the results of path analysis and hypotheses testing which represents the last part of data analysis and findings.

5.3.1 Structural Equation Modeling [SEM]

Structural equation modeling is similar to multiple regression, but in a more powerful way which takes into account the modeling of interactions between variables, nonlinearities, correlated independents, measurement error, correlated error terms, multiple latent independents each measured by multiple indicators, and one or more latent dependents also each with multiple indicators (Hair et al, 2011). SEM may be used as a more powerful alternative to multiple regression, path analysis, factor analysis, time series analysis, and analysis of covariance. That is, these procedures may be seen as special cases of SEM, or, to put it another way, SEM is an extension of the general linear model (GLM) of which multiple regression is a part.

First: Test the first main hypothesis:

-The first main hypothesis:

H1: There is a statistically significant relationship between the application of RCA and strategic cost management.

Branching out of it the following hypotheses;

H1.1 The first Sub-hypothesis: There is a statistically significant relationship between application of resource consumption accounting and Value chain. Branching out of it the following;

H1.1a There is a statistically significant relationship between The Nature of Cost and Value Chain Analysis.

H1.1b There is a statistically significant relationship between Quantity Structure and Value Chain Analysis.

H1.1c There is a statistically significant relationship between Resources focus and Value Chain Analysis.

H1.2: There is a statistically significant relationship between application of resource consumption accounting and Cost Driver Analysis. Branching out of it the following;

H1.2a: There is a statistically significant relationship between The Nature of Cost and Cost Driver Analysis.

H1.2b: There is a statistically significant relationship between Quantity structure and Cost Driver Analysis.

H1.2c: There is a statistically significant relationship between Resources focus and Cost Driver Analysis.

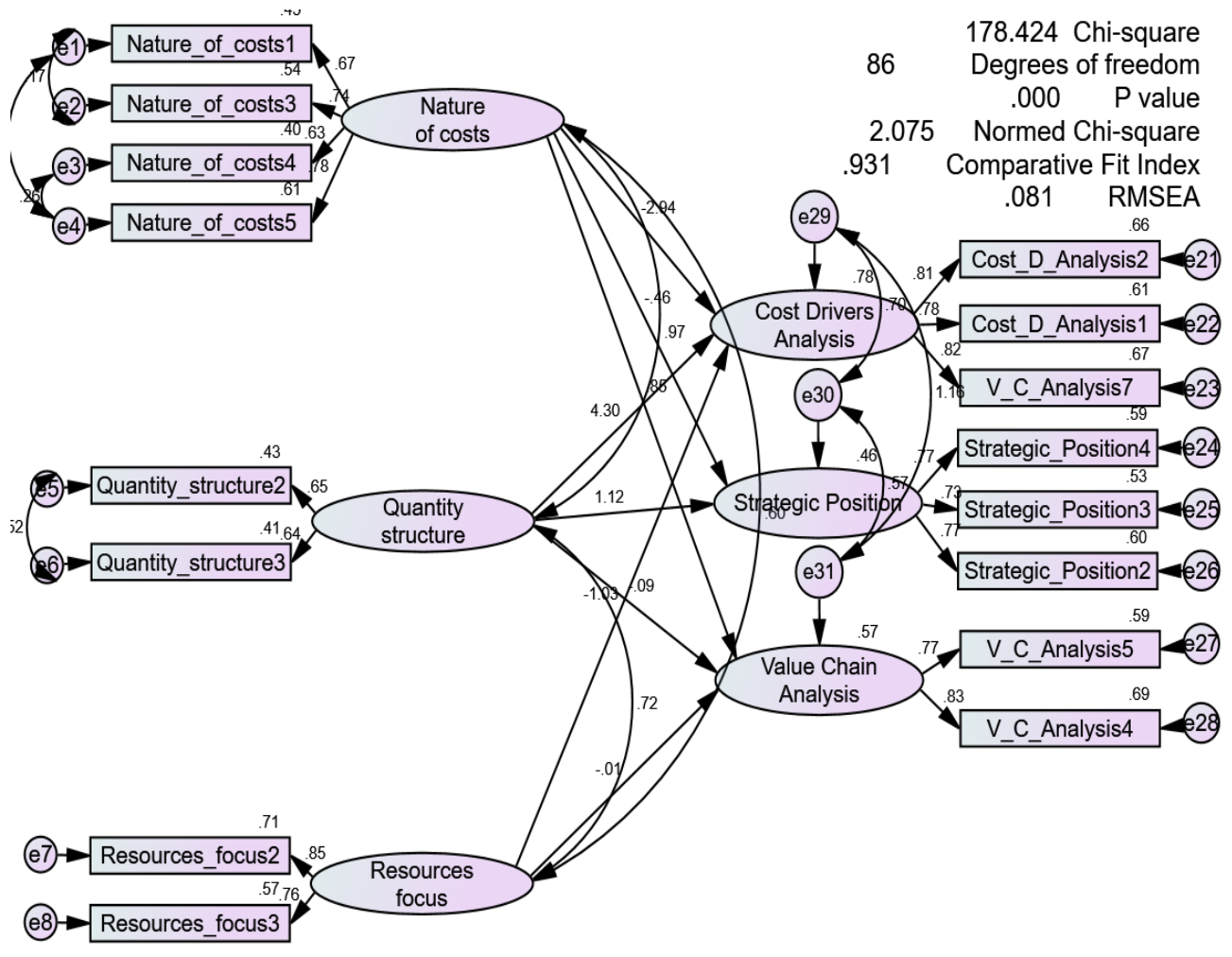
H1.3: There is a statistically significant relationship between application of resource consumption accounting and Strategic Positioning. Branching out of it the following;

H1.3a: There is a statistically significant relationship between The Nature of Cost and Strategic Positioning.

H1.3b: There is a statistically significant relationship between Quantity structure and Strategic Positioning.

The Effect of Resource Consumption Accounting on Strategic Cost Management

Figure (5.3.1)



Source: prepared By Researcher from the field study data 2018

The structural model reveals the same value of model fit shown in Table (5.3.1), all the model fit indices for the structural model were not only significant but remain same as in the measurement model. The high index of R square (i.e. 0.78, 46, 57) justifies the underlying theoretical model.

Table (5.3.1)

Measure	Estimate	Interpretation
CMIN/DF	2.075	Excellent
CFI	0.931	Acceptable
SRMR	0.053	Excellent
RMSEA	0.081	Terrible

PClose	0.002		Terrible			
Path analysis			Estimate	S.E.	C.R.	P
Cost_Drivers_Analysis	<---	Nature_of_costs	-4.237	18.093	-.234	.815
Cost_Drivers_Analysis	<---	Quantity_structure	5.323	18.045	.295	.768
Cost_Drivers_Analysis	<---	Resources_focus	-1.050	3.203	-.328	.743
Strategic_Position	<---	Nature_of_costs	-.559	1.005	-.557	.578
Strategic_Position	<---	Quantity_structure	1.153	.847	1.362	.173
Value_Chain_Analysis	<---	Nature_of_costs	1.276	5.666	.225	.822
Value_Chain_Analysis	<---	Quantity_structure	-.120	5.644	-.021	.983
Value_Chain_Analysis	<---	Resources_focus	-.013	1.001	-.013	.990

Source: prepared By Researcher from the field study data 2018

The probability of getting a critical ratio as large as 0.234 in absolute value is 0.815. In other words, the regression weight for Nature of costs in the prediction of Cost Drivers Analysis is not significantly different from zero at the 0.05 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between recognizing the essential nature of costs and Cost Driver, were not supported.

The probability of getting a critical ratio as large as 0.295 in absolute value is 0.768. In other words, the regression weight for Quantity structure in the prediction of Cost Drivers Analysis is not significantly different from zero at the 0.05 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Quantity structure for resource consumption and Cost Driver, were not supported.

The probability of getting a critical ratio as large as 0.328 in absolute value is 0.743. In other words, the regression weight for Resources focus in the prediction of Cost Drivers Analysis is not significantly different from zero at the 0.05 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between The Resources focus and Cost Driver Analysis, were not supported.

The probability of getting a critical ratio as large as 0.557 in absolute value is 0.578. In other words, the regression weight for Nature of costs in the prediction of Strategic Position is not significantly different from zero at the 0.05 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between The Nature of costs and Strategic Positioning, were not supported.

The probability of getting a critical ratio as large as 1.362 in absolute value is 0.173. In other words, the regression weight for Quantity structure in the prediction of Strategic Position is not significantly different from zero at the 0.05 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between The Quantity structure and Strategic Positioning, were not supported.

The probability of getting a critical ratio as large as 0.225 in absolute value is 0.822. In other words, the regression weight for Nature of costs in the prediction of Value Chain Analysis is not significantly different from zero at the 0.05 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between The Nature of Cost and Value chain Analysis, were not supported.

The probability of getting a critical ratio as large as 0.021 in absolute value is 0.983. In other words, the regression weight for Quantity structure in the prediction of Value Chain Analysis is not significantly different from zero at the 0.05 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between The Quantity structure and Value chain Analysis, were not supported.

The probability of getting a critical ratio as large as 0.013 in absolute value is 0.990. In other words, the regression weight for Resources focus in the prediction of Value Chain Analysis is not significantly different from zero at the 0.05 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between The Resources focus and Value chain Analysis, were not supported.

The results of the analysis show that the first main hypothesis which states there is a statistically significant relationship between the application of RCA and strategic cost management was not supported.

It is clear from the analysis that Resource Consumption Accounting (resource focus, nature of cost, quantity structure) affects cost driver analysis by 78% where the percentage of R square is 0.78, while Resource Consumption Accounting (resource focus, nature of cost, quantity structure) affects value chain analysis by 57%, and Resource Consumption Accounting (nature of cost, quantity structure) affects strategic position by 46% which is the lowest effect level.

Table (5.3.2) Summary of Hypotheses Testing Results

Item	Statement of Hypothesis	Remark
H1	There is a statistically significant relationship between the application of RCA and strategic cost management.	Not Supported
H1.1	There is a statistically significant relationship between application of resource consumption accounting and Value Chain Analysis.	Not Supported
H1.1a	There is a statistically significant relationship between The Nature of Cost and Value Chain Analysis.	Not Supported
H1.1b	There is a statistically significant relationship between Quantity structure and Value Chain Analysis.	Not Supported
H1.1c	There is a statistically significant relationship between Resources focus and Value Chain Analysis.	Not Supported
H1.2	There is a statistically significant relationship between application of resource consumption accounting and Cost Driver Analysis.	Not Supported
H1.2a	There is a statistically significant relationship between The Nature of Cost and Cost Driver Analysis.	Not Supported
H1.2b	There is a statistically significant relationship between Quantity structure and Cost Driver Analysis.	Not Supported
H1.2c	There is a statistically significant relationship between Resources focus and Cost Driver Analysis.	Not Supported
H1.3	There is a statistically significant relationship between application of resource consumption accounting and Strategic Positioning.	Not Supported
H1.3a	There is a statistically significant relationship between The Nature of Cost and Strategic Positioning.	Not Supported
H1.3b	There is a statistically significant relationship between Quantity structure and Strategic Positioning.	Not Supported

Source: prepared By Researcher from the field study data 2018

Second: Test the second main hypothesis:

H2: There is a statistically significant relationship between the application of Total Quality Principles and strategic cost management.

Branching out of it the following hypothesizes;

H2.1: There is a statistically significant relationship between application of Total Quality Principles and Value chain. Branching out of it the following;

H2.1a: There is a statistically significant relationship between application of Continuous Improvement and Value chain.

H2.1b: There is a statistically significant relationship between application of Customer focus and Value chain.

H2.1c: There is a statistically significant relationship between application of Management commitment and Value chain.

H2.1d: There is a statistically significant relationship between application of Fact based decision making and Value chain.

H2.2: There is a statistically significant relationship between application of Total Quality Principles and Cost Driver. Branching out of it the following;

H2.2a: There is a statistically significant relationship between application of Continuous Improvement and Cost Driver.

H2.2b: There is a statistically significant relationship between application of Customer focus and Cost Driver.

H2.2c: There is a statistically significant relationship between application of Management commitment and Cost Driver.

H2.2d: There is a statistically significant relationship between application of Fact based decision making and Cost Driver.

H2.3: There is a statistically significant relationship between application of Total Quality Principles and Strategic Positioning. Branching out of it the following;

H2.3a: There is a statistically significant relationship between application of Continuous Improvement and Strategic Positioning.

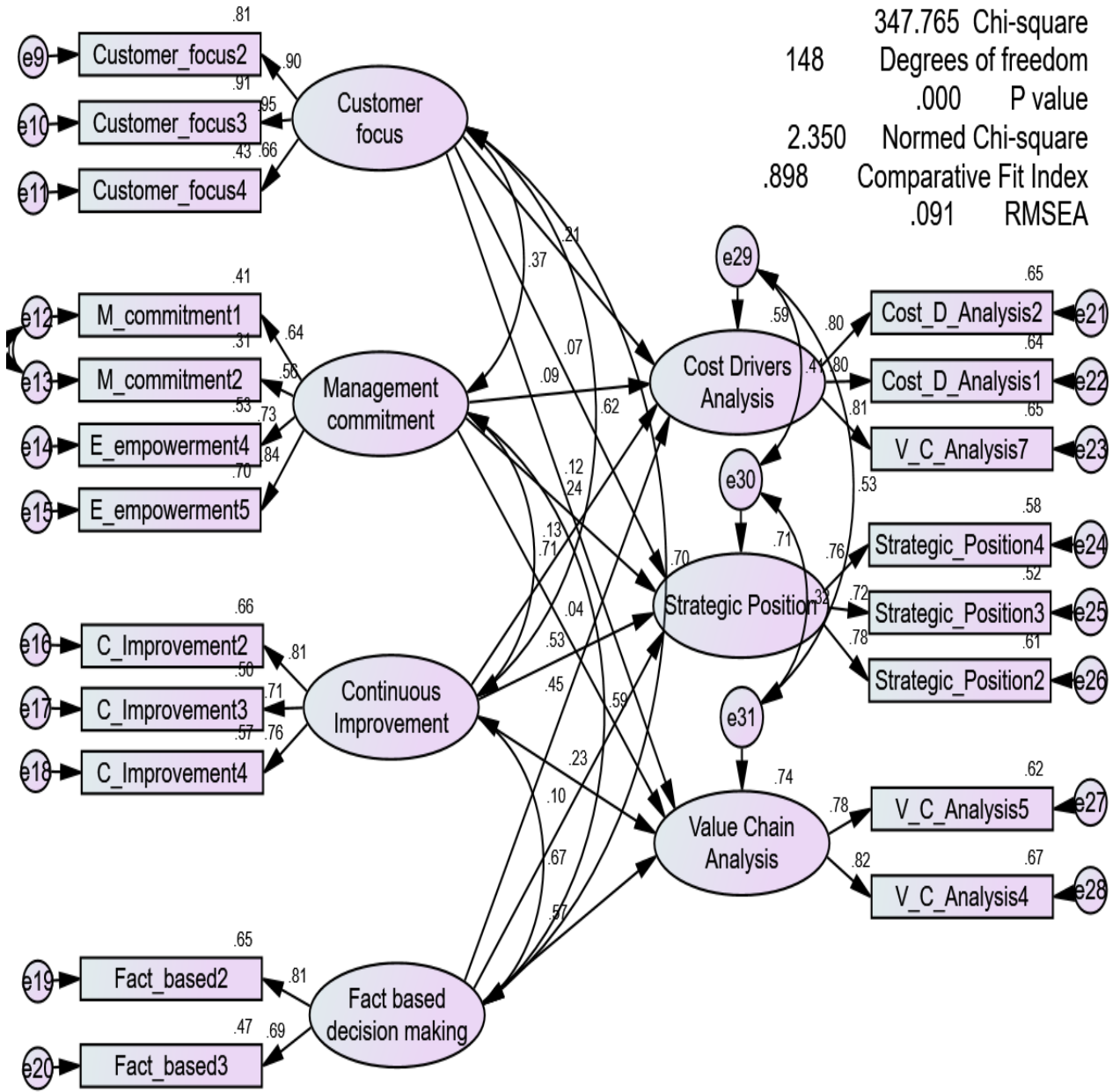
H2.3b: There is a statistically significant relationship between application of Customer focus and Strategic Positioning.

H2.3c: There is a statistically significant relationship between application of Management commitment and Strategic Positioning.

H2.3d: There is a statistically significant relationship between application of Fact based decision making and Strategic Positioning.

The Effect of Total Quality practices on Strategic Cost Management

Figure (5.3.2)



Source: prepared By Researcher from the field study data 2018

The structural model reveals the same value of model fit shown in Table (5.3.3), all the model fit indices for the structural model were not only significant but remain same as in the measurement model. The low index of R square (i.e. 0.59,71,74) justifies the underlying theoretical model.

Table (5.3.3)

Measure	Estimate	Interpretation			
CMIN/DF	2.350	Excellent			
CFI	0.898	Need More DF			
SRMR	0.073	Excellent			
RMSEA	0.091	Terrible			
PClose	0.000	Terrible			
Path analysis		Estimate	S.E.	C.R.	P
Cost_Drivers_Analysis	<--- Customer_focus	.208	.127	1.641	.101
Cost_Drivers_Analysis	<--- Management_commitment	.131	.201	.656	.512
Cost_Drivers_Analysis	<--- Continuous_Improvement	.157	.186	.845	.398
Cost_Drivers_Analysis	<--- Fact_based_decision_making	.476	.183	2.602	.009
Strategic_Position	<--- Customer_focus	.058	.095	.609	.542
Strategic_Position	<--- Management_commitment	.287	.159	1.806	.071
Strategic_Position	<--- Continuous_Improvement	.523	.154	3.391	***
Strategic_Position	<--- Fact_based_decision_making	.088	.128	.686	.493
Value_Chain_Analysis	<--- Customer_focus	.109	.125	.873	.383
Value_Chain_Analysis	<--- Management_commitment	.063	.195	.324	.746
Value_Chain_Analysis	<--- Continuous_Improvement	.265	.180	1.474	.141
Value_Chain_Analysis	<--- Fact_based_decision_making	.593	.187	3.163	.002

Source: prepared By Researcher from the field study data 2018

The probability of getting a critical ratio as large as 1.641 in absolute value is 0.101. In other words, the regression weight for Customer focus in the prediction of Cost Drivers Analysis is not significantly different from zero at the 0.05 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between The Customer focus and Cost Drivers Analysis, was not supported.

The probability of getting a critical ratio as large as 0.656 in absolute value is 0.512. In other words, the regression weight for Management commitment in the prediction of Cost Drivers Analysis is not significantly different from zero at the 0.05 level. This statistical indication shows that the sub -

hypothesis which states there is a statistically significant relationship between The Management commitment and Cost Drivers Analysis, was not supported.

The probability of getting a critical ratio as large as 0.845 in absolute value is 0.398. In other words, the regression weight for Continuous Improvement in the prediction of Cost Drivers Analysis is not significantly different from zero at the 0.05 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Continuous Improvement and Cost Drivers Analysis, was not supported.

The probability of getting a critical ratio as large as 2.602 in absolute value is 0.009. In other words, the regression weight for Fact based decision making in the prediction of Cost Drivers Analysis is significantly different from zero at the 0.01 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Facts based decision making and Cost Drivers Analysis, was supported.

The probability of getting a critical ratio as large as 0.609 in absolute value is 0.542. In other words, the regression weight for Customer focus in the prediction of Strategic Position is not significantly different from zero at the 0.05 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Customer focus and Strategic Position, was not supported.

The probability of getting a critical ratio as large as 3.391 in absolute value is less than 0.001. In other words, the regression weight for Continuous Improvement in the prediction of Strategic Position is significantly different from zero at the 0.001 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Continuous Improvement and Strategic Position, was supported.

The probability of getting a critical ratio as large as 0.686 in absolute value is 0.493. In other words, the regression weight for Fact based decision making in the prediction of Strategic Position is not significantly different from zero at the 0.05 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Facts based decision making and Strategic Position, was not supported.

The probability of getting a critical ratio as large as 0.873 in absolute value is 0.383. In other words, the regression weight for Customer focus in the prediction of Value Chain Analysis is not significantly different from zero at the 0.05 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Customer focus and Value Chain Analysis, was not supported.

The probability of getting a critical ratio as large as 0.324 in absolute value is 0.746. In other words, the regression weight for Management commitment in the prediction of Value Chain Analysis is not significantly different from zero at the 0.05 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Management commitment and Value Chain Analysis, was not supported.

The probability of getting a critical ratio as large as 1.474 in absolute value is .141. In other words, the regression weight for Continuous Improvement in the prediction of Value Chain Analysis is not significantly different from zero at the 0.05 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Continuous Improvement and Value Chain Analysis, was not supported.

The probability of getting a critical ratio as large as 3.163 in absolute value is 0.002. In other words, the regression weight for Fact based decision making in the prediction of Value Chain Analysis is significantly different from zero at the 0.01 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Facts based decision making and Value Chain Analysis, was supported.

Table (5.3.4) Summary of Hypotheses Testing Results

Item	Statement of Hypothesis	Remark
H2	There is a statistically significant relationship between the application of Total Quality and strategic cost management.	Partially Supported
H2.1	There is a statistically significant relationship between application of Total Quality and Value Chain Analysis.	Partially Supported
H2.1a	There is a statistically significant relationship	Not Supported

	between application of Continuous Improvement and Value chain Analysis.	
H2.1b	There is a statistically significant relationship between application of Customer focus and Value Chain Analysis.	Not Supported
H2.1c	There is a statistically significant relationship between application of Management commitment and Value Chain Analysis.	Not Supported
H2.1d	There is a statistically significant relationship between application of Fact based decision making and Value Chain Analysis.	Supported
H2.2	There is a statistically significant relationship between application of Total Quality and Cost Driver Analysis.	Partially Supported
H2.2a	There is a statistically significant relationship between application of Continuous Improvement and Cost Driver Analysis.	Not Supported
H2.2b	There is a statistically significant relationship between application of Customer focus and Cost Driver Analysis.	Not Supported
H2.2c	There is a statistically significant relationship between application of Management commitment and Cost Driver Analysis.	Not Supported
H2.2d	There is a statistically significant relationship between application of Fact based decision making and Cost Driver Analysis.	Supported
H2.3	There is a statistically significant relationship between application of Total Quality and Strategic Positioning.	Partially Supported
H2.3a	There is a statistically significant relationship between application of Continuous Improvement and Strategic Positioning.	Supported
H2.3b	There is a statistically significant relationship between application of Customer focus and Strategic Positioning.	Not Supported
H2.3c	There is a statistically significant relationship between application of Management commitment and Strategic Positioning.	Not Supported
H2.3d	There is a statistically significant relationship	Not Supported

	between application of Fact based decision making and Strategic Positioning.	
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Source: prepared By Researcher from the field study data 2018

Third: The Third main hypothesis:

H3: There is a positive relationship between the integration of Total Quality Principles and resource consumption accounting on strategic cost management.

Branching out of it the following hypothesizes;

H3.1: There is a positive relationship between the integration of customer focus and resource consumption accounting on strategic cost management. Branching out of it the following;

H3.1a: There is a positive relationship between the integration of customer focus and resource consumption accounting on Cost Drivers Analysis.

H3.1b: There is a positive relationship between the integration of customer focus and resource consumption accounting on Strategic Position.

H3.1c: There is a positive relationship between the integration of customer focus and resource consumption accounting on Value Chain Analysis.

H3.2: There is a positive relationship between the integration of Management commitment and resource consumption accounting on strategic cost management. Branching out of it the following;

H3.2a: There is a positive relationship between the integration of Management commitment and resource consumption accounting on Cost Drivers Analysis.

H3.2b: There is a positive relationship between the integration of Management commitment and resource consumption accounting on Strategic Position.

H3.2c: There is a positive relationship between the integration of Management commitment and resource consumption accounting on Value Chain Analysis.

H3.3: There is a positive relationship between the integration of Continuous Improvement and resource consumption accounting on strategic cost management. Branching out of it the following;

H3.3a: There is a positive relationship between the integration of Continuous Improvement and resource consumption accounting on Cost Drivers Analysis.

H3.3b: There is a positive relationship between the integration of Continuous Improvement and resource consumption accounting on Strategic Position.

H3.3c: There is a positive relationship between the integration of Continuous Improvement and resource consumption accounting on Value Chain Analysis.

H3.4: There is a positive relationship between the integration of Fact based decision making and resource consumption accounting on strategic cost management. Branching out of it the following;

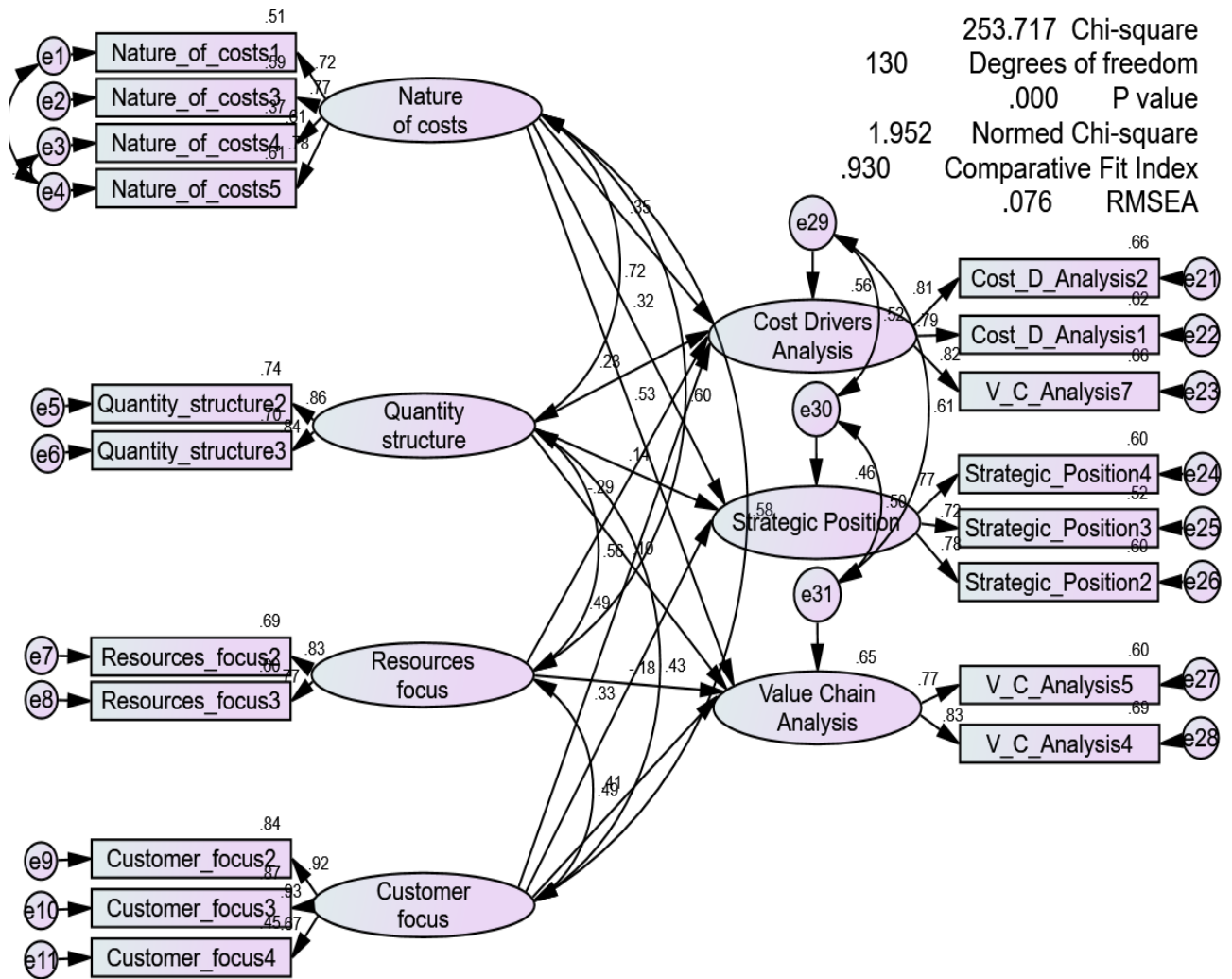
H3.4a: There is a positive relationship between the integration of Fact based decision making and resource consumption accounting on Cost Drivers Analysis.

H3.4b: There is a positive relationship between the integration of Fact based decision making and resource consumption accounting on Strategic Position.

H3.4c: There is a positive relationship between the integration of Fact based decision making and resource consumption accounting on Value Chain Analysis.

The interaction between customer focus and Resource Consumption Accounting on Strategic Cost Management

Figure (5.3.3)



Source: prepared By Researcher from the field study data 2018

The structural model reveals the same value of model fit shown in Table (5.3.5), all the model fit indices for the structural model were not only significant but remain same as in the measurement model. The low index of R square (i.e. 0.81,0.46,0.65) justifies the underlying theoretical model.

Table (5.3.5)

Measure	Estimate	Threshold	Interpretation
CMIN/DF	1.952	Between 1 and 3	Excellent
CFI	0.930	>0.95	Acceptable
SRMR	0.056	<0.08	Excellent

RMSEA	0.076	<0.06	Acceptable			
PClose	0.002	>0.05	Terrible			
			Estimate	S.E.	C.R.	P
Cost_Drivers_Analysis	<---	Nature_of_costs	.502	.210	2.396	.017
Cost_Drivers_Analysis	<---	Quantity_structure	.223	.122	1.826	.068
Cost_Drivers_Analysis	<---	Resources_focus	-.316	.114	-2.779	.005
Cost_Drivers_Analysis	<---	Customer_focus	.470	.092	5.126	***
Strategic_Position	<---	Nature_of_costs	.367	.173	2.127	.033
Strategic_Position	<---	Quantity_structure	.110	.102	1.080	.280
Strategic_Position	<---	Customer_focus	.253	.075	3.361	***
Value_Chain_Analysis	<---	Nature_of_costs	.744	.216	3.444	***
Value_Chain_Analysis	<---	Quantity_structure	.092	.119	.773	.439
Value_Chain_Analysis	<---	Resources_focus	-.188	.109	-1.726	.084
Value_Chain_Analysis	<---	Customer_focus	.388	.088	4.433	***

Source: prepared By Researcher from the field study data 2018

The probability of getting a critical ratio as large as 2.396 in absolute value is 0.017. In other words, the regression weight for Nature of costs in the prediction of Cost Drivers Analysis is significantly different from zero at the 0.05 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Nature of costs and Cost Drivers Analysis, was supported.

The probability of getting a critical ratio as large as 1.826 in absolute value is 0.068. In other words, the regression weight for Quantity structure in the prediction of Cost Drivers Analysis is not significantly different from zero at the 0.05 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Quantity structure and Cost Drivers Analysis, was not supported.

The probability of getting a critical ratio as large as 2.779 in absolute value is .005. In other words, the regression weight for Resources focus in the prediction of Cost Drivers Analysis is significantly different from zero at the 0.01 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Resources focus and Cost Drivers Analysis, was supported.

The probability of getting a critical ratio as large as 5.126 in absolute value is less than 0.001. In other words, the regression weight for Customer focus in the prediction of Cost Drivers Analysis is significantly different from zero at the 0.001 level. This statistical indication shows that the sub - hypothesis

which states there is a statistically significant relationship between Customer focus and Cost Drivers Analysis, was supported.

The probability of getting a critical ratio as large as 2.127 in absolute value is .033. In other words, the regression weight for Nature of costs in the prediction of Strategic Position is significantly different from zero at the 0.05 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Nature of costs and Strategic Position, was supported.

The probability of getting a critical ratio as large as 1.08 in absolute value is .280. In other words, the regression weight for Quantity structure in the prediction of Strategic Position is not significantly different from zero at the 0.05 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Quantity structure and Strategic Position, was not supported.

The probability of getting a critical ratio as large as 3.361 in absolute value is less than 0.001. In other words, the regression weight for Customer focus in the prediction of Strategic Position is significantly different from zero at the 0.001 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Customer focus and Strategic Position, was supported.

The probability of getting a critical ratio as large as 3.444 in absolute value is less than 0.001. In other words, the regression weight for Nature of costs in the prediction of Value Chain Analysis is significantly different from zero at the 0.001 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Nature of costs and Value Chain Analysis, was supported.

The probability of getting a critical ratio as large as 0.773 in absolute value is .439. In other words, the regression weight for Quantity structure in the prediction of Value Chain Analysis is not significantly different from zero at the 0.05 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Quantity structure and Value Chain Analysis, was supported.

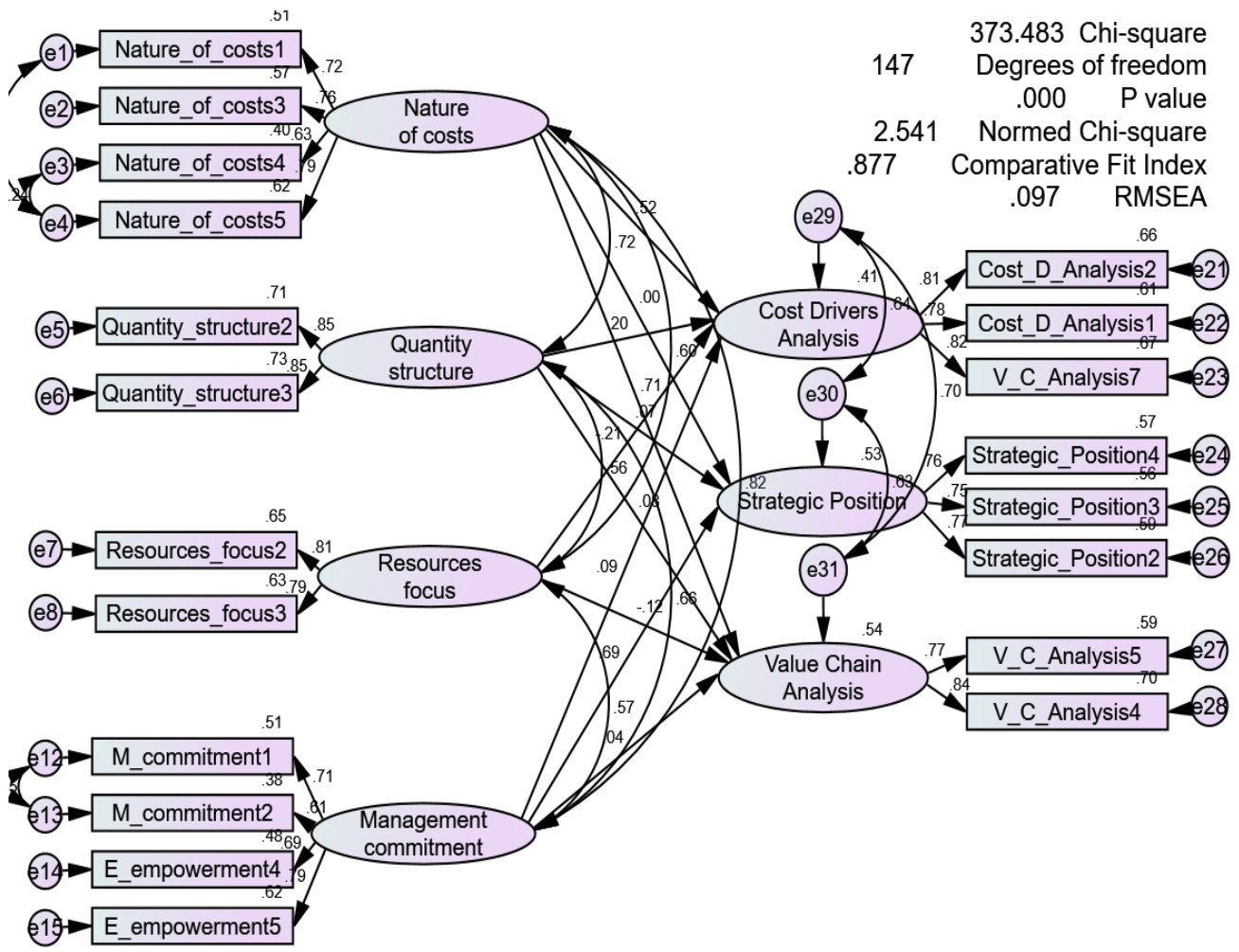
The probability of getting a critical ratio as large as 1.726 in absolute value is .084. In other words, the regression weight for Resources focus in the prediction of Value Chain Analysis is not significantly different from zero at the 0.05 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Resources focus and Value Chain Analysis, was not supported.

The probability of getting a critical ratio as large as 4.433 in absolute value is less than 0.001. In other words, the regression weight for Customer focus in the prediction of Value Chain Analysis is significantly different from zero at the 0.001 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Customer focus and Value Chain Analysis, was supported.

The second Sub-hypothesis: There is a positive relationship between the integration of management commitment and resource consumption accounting on strategic cost management.

The interaction between management commitment and Resource Consumption Accounting on Strategic Cost Management

Figure (5.3.4)



Source: prepared By Researcher from the field study data 2018

The structural model reveals the same value of model fit shown in Table (5.3.6), all the model fit indices for the structural model were not only significant but remain same as in the measurement model. The low index of R square (i.e. 0.41,0.53,0.54) justifies the underlying theoretical model.

Table (5.3.6)

Measure	Estimate	Threshold	Interpretation			
CMIN/DF	2.541	Between 1 and 3	Excellent			
CFI	0.877	>0.95	Need More DF			
SRMR	0.063	<0.08	Excellent			
RMSEA	0.097	<0.06	Terrible			
PClose	0.000	>0.05	Terrible			
			Estimate	S.E.	C.R.	P
Cost_Drivers_Analysis	<---	Nature_of_costs	.751	.323	2.326	.020
Cost_Drivers_Analysis	<---	Quantity_structure	.199	.138	1.442	.149
Cost_Drivers_Analysis	<---	Resources_focus	-.237	.120	-1.971	.049
Cost_Drivers_Analysis	<---	Management_commitment	.123	.262	.471	.637
Strategic_Position	<---	Nature_of_costs	-.004	.239	-.016	.987
Strategic_Position	<---	Quantity_structure	.055	.104	.527	.598
Strategic_Position	<---	Management_commitment	.724	.222	3.253	.001
Value_Chain_Analysis	<---	Nature_of_costs	.997	.329	3.030	.002
Value_Chain_Analysis	<---	Quantity_structure	.079	.133	.592	.554
Value_Chain_Analysis	<---	Resources_focus	-.131	.118	-1.113	.266
Value_Chain_Analysis	<---	Management_commitment	.057	.257	.220	.826

Source: prepared By Researcher from the field study data 2018

The probability of getting a critical ratio as large as 2.326 in absolute value is .020. In other words, the regression weight for Nature of costs in the prediction of Cost Drivers Analysis is significantly different from zero at the 0.05 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Nature of costs and Cost Drivers Analysis, was supported.

The probability of getting a critical ratio as large as 1.442 in absolute value is .149. In other words, the regression weight for Quantity structure in the prediction of Cost Drivers Analysis is not significantly different from zero at the 0.05 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Quantity structure and Cost Drivers Analysis, was not supported.

The probability of getting a critical ratio as large as 1.971 in absolute value is .049. In other words, the regression weight for Resources focus in the prediction of Cost Drivers Analysis is significantly different from zero at the 0.05 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Resources focus and Cost Drivers Analysis, was supported.

The probability of getting a critical ratio as large as 0.471 in absolute value is .637. In other words, the regression weight for Management commitment in the prediction of Cost Drivers Analysis is not significantly different from zero at the 0.05 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Management commitment and Cost Drivers Analysis, was not supported.

The probability of getting a critical ratio as large as 0.016 in absolute value is .987. In other words, the regression weight for Nature of costs in the prediction of Strategic Position is not significantly different from zero at the 0.05 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Nature of costs and Strategic Position, was not supported.

The probability of getting a critical ratio as large as 0.527 in absolute value is .598. In other words, the regression weight for Quantity structure in the prediction of Strategic Position is not significantly different from zero at the 0.05 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Quantity structure and Strategic Position, was not supported.

The probability of getting a critical ratio as large as 3.253 in absolute value is .001. In other words, the regression weight for Management commitment in the prediction of Strategic Position is significantly different from zero at the 0.001 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Management commitment and Strategic Position, was supported.

The probability of getting a critical ratio as large as 3.03 in absolute value is .002. In other words, the regression weight for Nature of costs in the prediction of Value Chain Analysis is significantly different from zero at the 0.01 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Nature of costs and Value Chain Analysis, was supported.

The probability of getting a critical ratio as large as 0.592 in absolute value is .554. In other words, the regression weight for Quantity structure in the prediction of Value Chain Analysis is not significantly different from zero at the 0.05 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Quantity structure and Value Chain Analysis, was not supported.

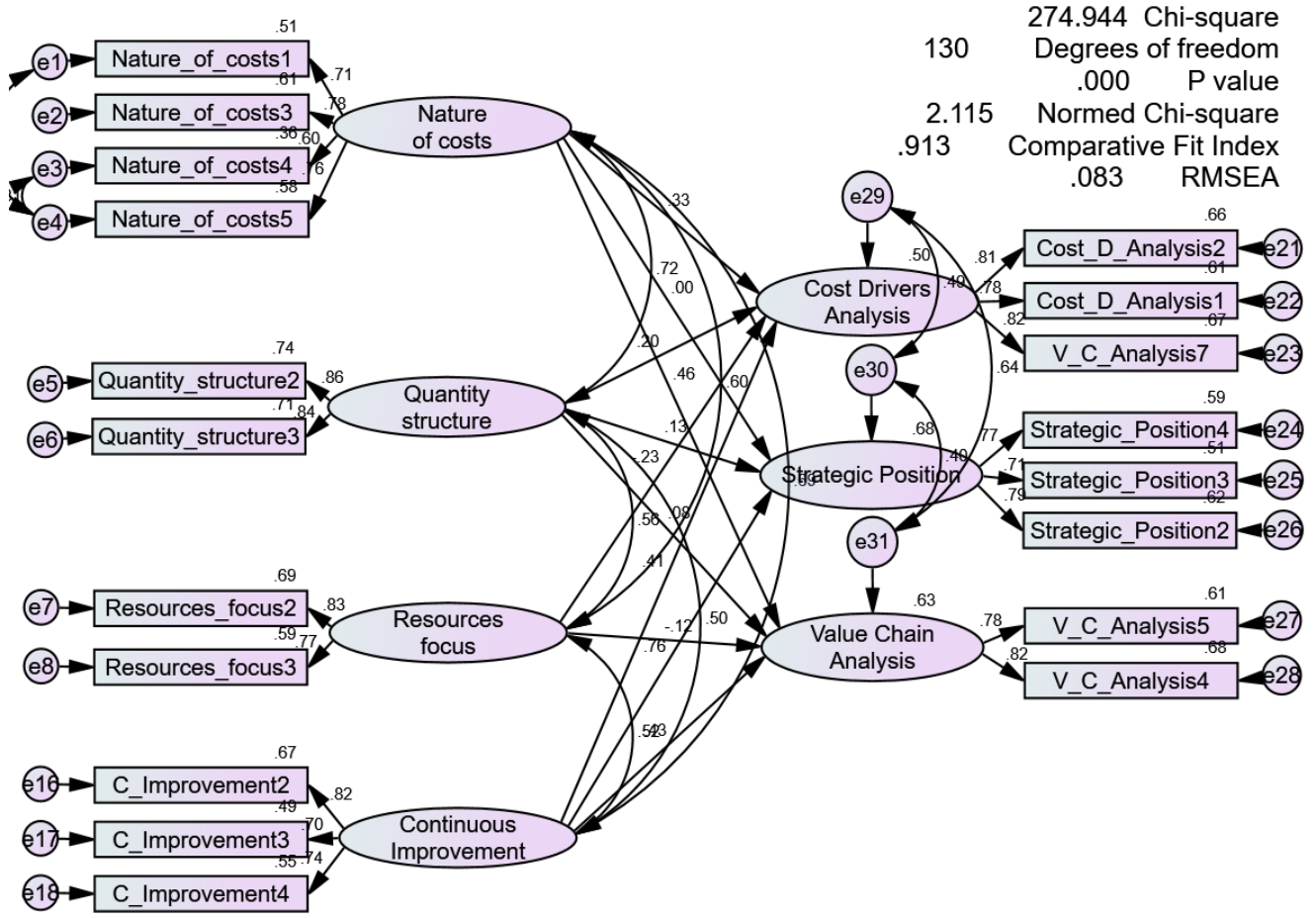
The probability of getting a critical ratio as large as 1.113 in absolute value is .266. In other words, the regression weight for Resources focus in the prediction of Value Chain Analysis is not significantly different from zero at the 0.05 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Resources focus and Value Chain Analysis, was not supported.

The probability of getting a critical ratio as large as 0.22 in absolute value is .826. In other words, the regression weight for Management commitment in the prediction of Value Chain Analysis is not significantly different from zero at the 0.05 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Management commitment and Value Chain Analysis, was not supported.

The third Sub-hypothesis: There is a positive relationship between the integration of continuous improvement and resource consumption accounting on strategic cost management.

The interaction between continuous improvement and Resource Consumption Accounting on Strategic Cost Management

Figure (5.3.5)



Source: prepared By Researcher from the field study data 2018

The structural model reveals the same value of model fit shown in Table (5.3.7), all the model fit indices for the structural model were not only significant but remain same as in the measurement model. The low index of R square (i.e. 0.50,0.68,0.63) justifies the underlying theoretical model.

Table (5.3.7)

Measure	Estimate	Threshold	Interpretation
CMIN/DF	2.115	Between 1 and 3	Excellent
CFI	0.913	>0.95	Acceptable
SRMR	0.055	<0.08	Excellent
RMSEA	0.083	<0.06	Terrible
PClose	0.000	>0.05	Terrible

		Estimate	S.E.	C.R.	P
Cost_Drivers_Analysis <---	Nature_of_costs	.484	.248	1.955	.051
Cost_Drivers_Analysis <---	Quantity_structure	.204	.130	1.565	.118
Cost_Drivers_Analysis <---	Resources_focus	-.255	.116	-2.204	.028
Cost_Drivers_Analysis <---	Continuous_Improvement	.500	.155	3.230	.001
Strategic_Position <---	Nature_of_costs	-.004	.184	-.019	.985
Strategic_Position <---	Quantity_structure	.102	.097	1.052	.293
Strategic_Position <---	Continuous_Improvement	.740	.131	5.646	***
Value_Chain_Analysis <---	Nature_of_costs	.638	.239	2.664	.008
Value_Chain_Analysis <---	Quantity_structure	.075	.122	.610	.542
Value_Chain_Analysis <---	Resources_focus	-.128	.109	-1.176	.240
Value_Chain_Analysis <---	Continuous_Improvement	.496	.146	3.400	***

Source: prepared By Researcher from the field study data 2018

The probability of getting a critical ratio as large as 1.955 in absolute value is .051. In other words, the regression weight for Nature of costs in the prediction of Cost Drivers Analysis is not significantly different from zero at the 0.05 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Nature of costs and Cost Drivers Analysis, was not supported.

The probability of getting a critical ratio as large as 1.565 in absolute value is .118. In other words, the regression weight for Quantity structure in the prediction of Cost Drivers Analysis is not significantly different from zero at the 0.05 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Quantity structure and Cost Drivers Analysis, was not supported.

The probability of getting a critical ratio as large as 2.204 in absolute value is .028. In other words, the regression weight for Resources focus in the prediction of Cost Drivers Analysis is significantly different from zero at the 0.05 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Resources focus and Cost Drivers Analysis, was supported.

The probability of getting a critical ratio as large as 3.23 in absolute value is .001. In other words, the regression weight for Continuous Improvement in the prediction of Cost Drivers Analysis is significantly different from zero at the 0.001 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Continuous Improvement and Cost Drivers Analysis, was supported.

The probability of getting a critical ratio as large as 0.019 in absolute value is .985. In other words, the regression weight for Nature of costs in the prediction of Strategic Position is not significantly different from zero at the 0.05 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Nature of costs and Strategic Position, was not supported.

The probability of getting a critical ratio as large as 1.052 in absolute value is .293. In other words, the regression weight for Quantity structure in the prediction of Strategic Position is not significantly different from zero at the 0.05 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Quantity structure and Strategic Position, was not supported.

The probability of getting a critical ratio as large as 5.646 in absolute value is less than 0.001. In other words, the regression weight for Continuous Improvement in the prediction of Strategic Position is significantly different from zero at the 0.001 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Nature of costs and Strategic Position, was supported.

The probability of getting a critical ratio as large as 2.664 in absolute value is .008. In other words, the regression weight for Nature of costs in the prediction of Value Chain Analysis is significantly different from zero at the 0.01 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Nature of costs and Value Chain Analysis, was supported.

The probability of getting a critical ratio as large as 0.61 in absolute value is .542. In other words, the regression weight for Quantity structure in the prediction of Value Chain Analysis is not significantly different from zero at the 0.05 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Quantity structure and Value Chain Analysis, was not supported.

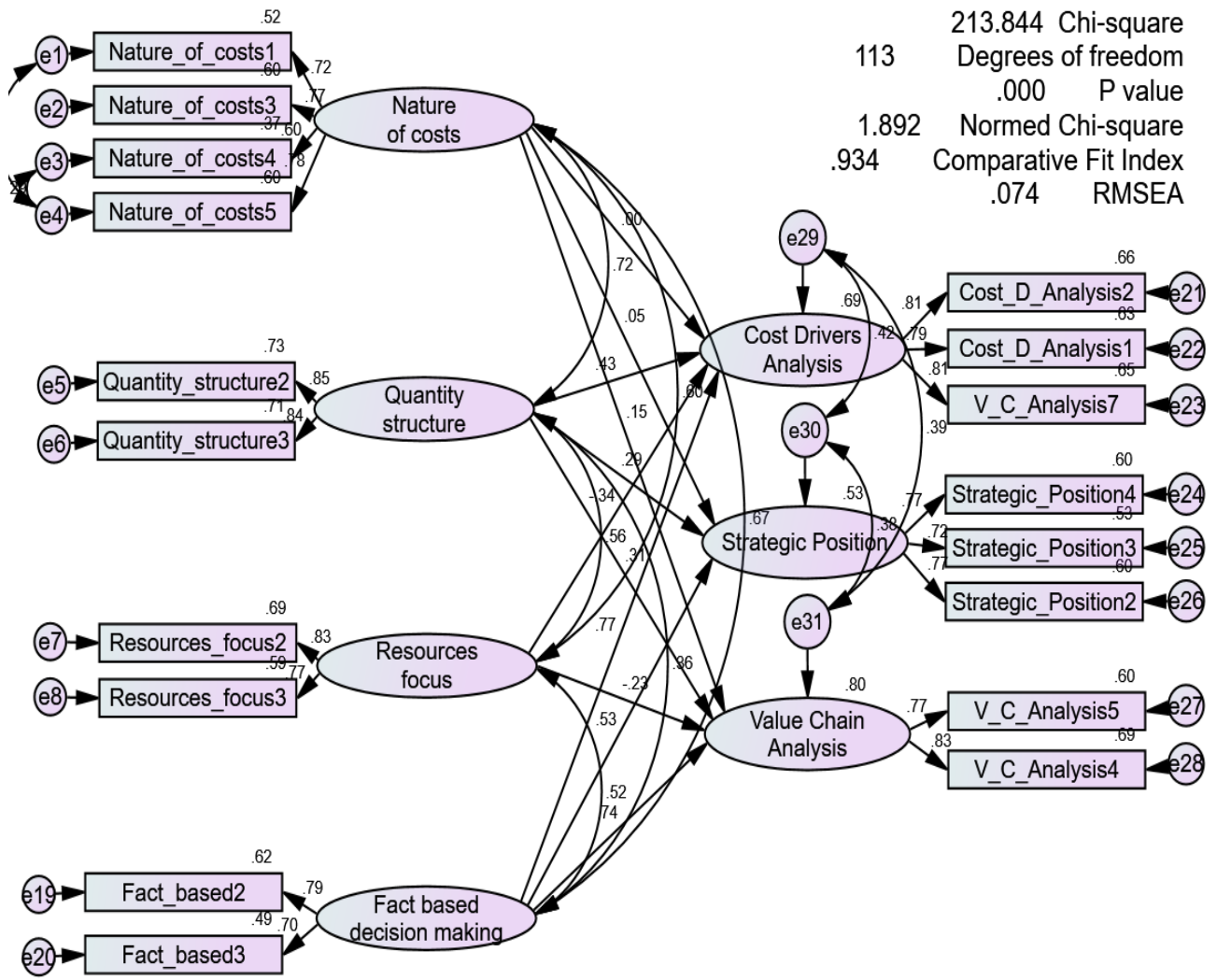
The probability of getting a critical ratio as large as 1.176 in absolute value is .240. In other words, the regression weight for Resources focus in the prediction of Value Chain Analysis is not significantly different from zero at the 0.05 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Resources focus and Value Chain Analysis, was not supported.

The probability of getting a critical ratio as large as 3.4 in absolute value is less than 0.001. In other words, the regression weight for Continuous Improvement in the prediction of Value Chain Analysis is significantly different from zero at the 0.001 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Continuous Improvement and Value Chain Analysis, was supported.

The fourth Sub-hypothesis: There is a positive relationship between the integration of facts based decision making and resource consumption accounting on strategic cost management.

The interaction between facts based decision making and Resource Consumption Accounting on Strategic Cost Management

Figure (5.3.6)



Source: prepared By Researcher from the field study data 2018

The structural model reveals the same value of model fit shown in Table (5.3.8), all the model fit indices for the structural model were not only significant but remain same as in the measurement model. The low index of R square (i.e. 0.69,0.53,0.80) justifies the underlying theoretical model.

Table (5.3.8)

Measure	Estimate	Threshold	Interpretation			
CMIN/DF	1.892	Between 1 and 3	Excellent			
CFI	0.934	>0.95	Acceptable			
SRMR	0.054	<0.08	Excellent			
RMSEA	0.074	<0.06	Acceptable			
PClose	0.006	>0.05	Terrible			
			Estimate	S.E.	C.R.	P
Cost_Drivers_Analysis	<---	Nature_of_costs	.000	.286	.000	1.000
Cost_Drivers_Analysis	<---	Quantity_structure	.427	.152	2.813	.005
Cost_Drivers_Analysis	<---	Resources_focus	-.363	.124	-2.916	.004
Cost_Drivers_Analysis	<---	Fact_based_decision_making	.840	.197	4.258	***
Strategic_Position	<---	Nature_of_costs	.053	.229	.233	.816
Strategic_Position	<---	Quantity_structure	.229	.114	1.997	.046
Strategic_Position	<---	Fact_based_decision_making	.465	.138	3.359	***
Value_Chain_Analysis	<---	Nature_of_costs	.216	.268	.804	.421
Value_Chain_Analysis	<---	Quantity_structure	.296	.139	2.129	.033
Value_Chain_Analysis	<---	Resources_focus	-.245	.115	-2.128	.033
Value_Chain_Analysis	<---	Fact_based_decision_making	.798	.183	4.365	***

Source: prepared By Researcher from the field study data 2018

The probability of getting a critical ratio as large as 0 in absolute value is 1.000. In other words, the regression weight for Nature of costs in the prediction of Cost Drivers Analysis is not significantly different from zero at

the 0.05 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Nature of costs and Cost Drivers Analysis, was not supported.

The probability of getting a critical ratio as large as 2.813 in absolute value is .005. In other words, the regression weight for Quantity structure in the prediction of Cost Drivers Analysis is significantly different from zero at the 0.01 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Quantity structure and Cost Drivers Analysis, was not supported.

The probability of getting a critical ratio as large as 2.916 in absolute value is .004. In other words, the regression weight for Resources focus in the prediction of Cost Drivers Analysis is significantly different from zero at the 0.01 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Resources focus and Cost Drivers Analysis, was supported.

The probability of getting a critical ratio as large as 4.258 in absolute value is less than 0.001. In other words, the regression weight for Fact based decision making in the prediction of Cost Drivers Analysis is significantly different from zero at the 0.001 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Fact based decision making and Cost Drivers Analysis, was supported.

The probability of getting a critical ratio as large as 0.233 in absolute value is .816. In other words, the regression weight for Nature of costs in the prediction of Strategic Position is not significantly different from zero at the 0.05 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Nature of costs and Strategic Position, was not supported.

The probability of getting a critical ratio as large as 1.997 in absolute value is .046. In other words, the regression weight for Quantity structure in the prediction of Strategic Position is significantly different from zero at the 0.05 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Quantity structure and Strategic Position, was supported.

The probability of getting a critical ratio as large as 3.359 in absolute value is less than 0.001. In other words, the regression weight for Fact based

decision making in the prediction of Strategic Position is significantly different from zero at the 0.001 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Fact based decision making and Strategic Position, was supported.

The probability of getting a critical ratio as large as 0.804 in absolute value is .421. In other words, the regression weight for Nature of costs in the prediction of Value Chain Analysis is not significantly different from zero at the 0.05 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Nature of costs and Value Chain Analysis, was not supported.

The probability of getting a critical ratio as large as 2.129 in absolute value is .033. In other words, the regression weight for Quantity structure in the prediction of Value Chain Analysis is significantly different from zero at the 0.05 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Quantity structure and Value Chain Analysis, was not supported.

The probability of getting a critical ratio as large as 2.128 in absolute value is .033. In other words, the regression weight for Resources focus in the prediction of Value Chain Analysis is significantly different from zero at the 0.05 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Resources focus and Value Chain Analysis, was supported.

The probability of getting a critical ratio as large as 4.365 in absolute value is less than 0.001. In other words, the regression weight for Fact based decision making in the prediction of Value Chain Analysis is significantly different from zero at the 0.001 level. This statistical indication shows that the sub - hypothesis which states there is a statistically significant relationship between Fact based decision making and Value Chain Analysis, was supported.

The following table (5.3.9) summarizes the hypothesis test;

Table (5.3.9) Summary of Hypotheses Testing Results

Item	Statement of Hypothesis	Remark
H3	There is a positive relationship between the integration of Total Quality Principles and	Partially Supported

	resource consumption accounting on strategic cost management.	
H3.1	There is a positive relationship between the integration of customer focus and resource consumption accounting on strategic cost management.	Partially Supported
H3.1a	There is a positive relationship between the integration of customer focus and resource consumption accounting on Cost Drivers Analysis.	Partially Supported
H3.1b	There is a positive relationship between the integration of customer focus and resource consumption accounting on Strategic Position.	Partially Supported
H3.1c	There is a positive relationship between the integration of customer focus and resource consumption accounting on Value Chain Analysis.	Partially Supported
H3.2	There is a positive relationship between the integration of Management commitment and resource consumption accounting on strategic cost management.	Partially Supported
H3.2a	There is a positive relationship between the integration of Management commitment and resource consumption accounting on Cost Drivers Analysis.	Partially Supported
H3.2b	There is a positive relationship between the integration of Management commitment and resource consumption accounting on Strategic Position.	Partially Supported
H3.2c	There is a positive relationship between the integration of Management commitment and resource consumption accounting on Value Chain Analysis.	Partially Supported
H3.3	There is a positive relationship between the integration of Continuous Improvement and resource consumption accounting on strategic cost management.	Partially Supported
H3.3a	There is a positive relationship between the integration of Continuous Improvement and	Partially Supported

	resource consumption accounting on Cost Drivers Analysis.	
H3.3b	There is a positive relationship between the integration of Continuous Improvement and resource consumption accounting on Strategic Position.	Partially Supported
H3.3c	There is a positive relationship between the integration of Continuous Improvement and resource consumption accounting on Value Chain Analysis.	Partially Supported
H3.4	There is a positive relationship between the integration of Fact based decision making and resource consumption accounting on strategic cost management.	Partially Supported
H3.4a	There is a positive relationship between the integration of Fact based decision making and resource consumption accounting on Cost Drivers Analysis.	Partially Supported
H3.4b	There is a positive relationship between the integration of Fact based decision making and resource consumption accounting on Strategic Position.	Partially Supported
H3.4c	There is a positive relationship between the integration of Fact based decision making and resource consumption accounting on Value Chain Analysis.	Partially Supported

Source: prepared By Researcher from the field study data 2018

5.3.2 DISCUSSION AND CONCLUSION

The aim of this study mainly was to study the effect of the integration between Resource Consumption Accounting and Total Quality practices on Strategic Cost Management. The research model of this thesis was developed both from the literature review. Methodological issues were also addressed for the examination of the relationship in the conceptual model the data was collected from purposive sample by a cross-sectional survey of Sudanese food industries companies. The research model and hypotheses were tested with the path analysis that discloses the effect of independent

variables on the dependent variable with Structural Equation Modeling (SEM) using AMOS.

To achieve the aims of the study the questions are as follows:

- Is there a relationship between the application of resource consumption accounting and strategic cost management?
- Does the application of Total Quality practices effect strategic cost management?
- Can the integration between resource consumption accounting and total quality practices effect on strategic cost management?

1. Summary of results:

The first hypothesis predicts that there is a statistically significant relationship between the application of resource consumption accounting and strategic cost management. The results outlined that Resource Consumption Accounting has no positive effect on Strategic Cost Management.

The second hypothesis predicts that there is a statistically significant relationship between application of Total Quality practices and strategic cost management. The results show that there is a positive relationship between Total Quality practices and Strategic Cost Management.

The third hypothesis predicts that there is a positive relationship between the integration of Total Quality and resource consumption accounting on strategic cost management. The results proven that there is a positive relationship between the integration of Total Quality and resource consumption accounting on strategic cost management.

2. Discussion of results:

2.1 Impact of relationship between resource consumption accounting and strategic cost management

The relationship between resource consumption accounting (Nature of costs, Quantity structure, Resources focus) and strategic cost management (Cost Drivers Analysis, Strategic Position, Value Chain Analysis). The result

revealed that the application of resource consumption accounting has no effect on strategic cost management. This result was not consistent with the results of (Shenghua, Dong, 2011) this study resulted that the application of resource consumption accounting in project cost management can refine the cost management processes, the discrepancy is due to, this study is a case study applied to Manufacturing Engineering Project in China. Also this result did not agree with the results of (Jihad Rehabi, 2013) which reached that there is a positive relationship between application of resource consumption accounting systems and reducing the cost of the final product, the difference is due to, his study is a case study applied to Jordanian industrial companies, as well as (Mokhtar, Abdel Aziz, 2013) whom their results disagree with this result, and their result was there is an agreement between the views of the study sample on the contributions and effects of resource consumption accounting in the development of cost management systems in the company under study, the difference between the results is due to, their study is a case study applied to Egyptian industrial companies.

Theoretically, application of resource consumption accounting has an effect on strategic cost management. According to (Sally Webber, 2004) RCA takes advantage of an enterprise resource planning (ERP) system's ability to track, maintain, and group the most detailed information and to effectively integrate operational/logistical and monetary information. This detail will support the most precise analyses at the lowest levels (e.g., for a machine or its operators), yet it easily can be aggregated to provide summary-level strategic data or data grouping at virtually any other level. This statement proved that the information that RCA present can be useful for strategic cost management, moreover this information is for long and short term, RCA provides direct insight into resource capacity management and capacity costs (Larry White, 2009), which can help reducing the cost of the product and providing accurate and reliable information in decision making, and that confirm by (David Perkins, O. Scott Stovall, 2011) who mention that Perhaps the most unique contribution that RCA makes to variance analysis is the ability to analyze changes in capacity utilization (i.e., volume variances) at the resource level, furthermore, management can monitor the reported amounts of idle capacity at the resource level to identify those resources that

represent potential bottlenecks to the system due to capacity shortfalls or represent opportunities for cost savings by eliminating resource capacity that exceeds foreseeable requirements, this analysis no other system can provide and can affect the factor of strategic cost management, affect cost drivers analysis by providing cost drivers analysis, affect strategic position by reducing the cost of product which can help to gain cost advantage, and affect value chain analysis by providing variance analysis identify the value added and non-value added activities.

The difference between the result of these study and theoretical framework and previous studies is due to firstly, the tools of the study; in this study the questionnaire was used as a tool, while the previous studies were a case study. Secondly, the difference is due to the environment and population of the study, where the study population in this study was Sudanese food industry companies, while previous studies were different countries not including Sudan. Moreover, this system (RCA) has not been applied in the Sudanese food industry companies, not even partly, most companies apply traditional systems. Proof of that was the percentage of companies applying traditional methods in these study were (78.1%).

2.2 Impact of relationship between Total Quality practices and strategic cost management

The relationship between Total Quality practices (Customer focus, Management commitment, Continuous Improvement, Fact based decision making) and strategic cost management (Cost Drivers Analysis, Strategic Position, Value Chain Analysis). The results reveal out that Total Quality practices partially effect on strategic cost management. According to (Marsel Sulanjaku, Ali Shingjergji, 2015) who mention that Strategic cost management is a philosophy of improving cost and revenue; it is not only cost management but also revenue management, therefore, it is seeking to improve productivity, maximize profit, and improve customer satisfaction. A lot of studies prove that implement Total Quality Management reduce cost, improve productivity, maximize profit, and certainly improve customer satisfaction. Study of (Masood U., et al, 2014) the matrix shows that every dimension of TQM construct has statistically significant correlation with

operational efficiency, product quality and customer satisfaction. The findings of (Deepak Subedi, Suneel Maheshwari, 2007) indicating that total quality management can have positive impact on the increase in earnings and sales growth. The study of (Zulnaidi Yaacob, 2010) shows that the Quality Management practices significantly correlated to cost savings. The results of (Sin Kit Yeng, et al., 2018) confirm that TQM efforts result in an increase in sales. Both incremental and breakthrough improvements enhance productivity by decreasing costs and/or improving performance. Performance is enhanced through greater responsiveness, shorter cycle times for new products or services, better products, shorter throughput time and unique marketing, engineering or production strategies. Costs decline by reducing errors, defects and wastage. Study of (Oriare, Sheila Dawn, 2011) this study concludes that Total Quality Management has many practical applications in strategy functions. (Masoud Nouri, 2013) Correlation analysis shows that total quality management has a significant positive relationship with differentiation strategy. Moreover, study of (Hailiang Huang, Chaofeng Zhang, 2013) "Improve quality, and all else will follow" has been summarized as the attitude of the world-class company. TQM provides significant help for companies to reduce their non-value added activities and improve value added activities.

Partial support of the hypothesis is due to the incomplete application of the TQ system in Sudanese Food Industries, all the attention of those companies is focused on quality, some companies even have ISO9000 quality certification, but those companies do not care about other quality principles.

2.3 Impact of the integration of Total Quality and resource consumption accounting on strategic cost management

The effect of the integration of Total Quality and resource consumption accounting on strategic cost management. The results proven that the hypothesis there is a positive relationship between the integration of Total Quality and resource consumption accounting on strategic cost management partially supported. The majority of the literature on accounting change in a TQM environment is from the integration perspective, study of (Carmen Necula, 2009) argue that The focus on cost, quality and period of time, has

generated more change management with important implications in Managerial Accounting. These changes include increasing the strategic management initiatives, such as activity-based costing (ABC) and Total Quality Management (TQM). (Majeed Abdul Hussien, 2015) the target costing and continuous improvement techniques are represent the most important techniques of strategic cost management lead to a significant impact in the successful implementation of competitiveness strategies (least-cost, differentiation, and focus), because the results from the application of these techniques lead to the objectives of these strategies of primarily the basis for the reduction of production costs and improve its quality. (Sana Hamzat, 2016) study found that the implementation of the Total Quality Management System (TQMS) helps to manage costs in the facilities used for the target cost input.

This hypothesis partially supported because of it consist of two parts, the first one RCA which is not applied in the Sudanese food industry companies, and the second parts TQ which is partially implemented, and this does not reflect actual results on the impact of integration of Total Quality and resource consumption accounting.

3. Findings:

- 1- The integration of resource consumption accounting and total quality positively affects strategic cost management.
- 2- There is a positive relationship between the application of total quality practices and strategic cost management.
- 3- Most food industry companies in Khartoum apply traditional cost systems, which affect the confidence in accounting information, and can create tremendous problems within an organization.
- 4- Lack of interest of the vast majority of food industry companies in Khartoum about costs information and managerial accounting, moreover most of them do not have a separate division of costs and they don't separate the accounting system from the cost system, and relying mainly on the

financial accounting system only as an accounting information and data system.

5- Lack of interest of most food industry companies in Khartoum to train and qualify employees and involve them in decision-making processes.

6- The interest of most food industry companies in Khartoum in the process of product quality only and neglect the other principles of total quality, and that for their interest in obtaining a quality certificate (ISO certification).

7- Most of the food industry companies in Khartoum don't care about resources and the optimal exploitation of them and lack of attention to idle capacity.

8- When the cost/resource flow relationships are quantity-based, and modeled in a manner that reflects cause-and-effect relationships, that will support an extremely wide range of decision and planning scenarios.

9- As a result of the high inflation rate in the country, the use of RCA to measure the cost is considered appropriate because of its quantitative basis.

10- RCA is a panacea for improved operational and cost knowledge to optimize business enterprises, particularly those with complex operations, tight margins, and large capital investments. However, it is not a quick fix and complicated. So it can be applied in big and complex organizations.

11- The determination of idle capacity draws management attention to it and helps in finding solutions by either use or disposal it.

12- The resource consumption accounting system focuses on resources as the main reason for the cost and revenue.

13- Identify the main cause of cost, which is a resource according to the RCA system that helps in understanding the cost, establishing the cost structure and the possibility of reducing costs.

14- When applying the RCA system, this is reflected in the proper and appropriate pricing of the product through the accurate and precise definition of the cost of the product.

15- Paying attention to the cost of quality and presenting its own reports, it considers as an instrument for gaining senior management commitment, highlighting areas for improvement, managers can use this information in better planning, controlling, and evaluating the process of delivering the products that customers want.

16- The application of total quality enables the use of scientific and statistical tools to make decisions, develop strategies and monitor them.

17- Continual improvement and waste elimination are foundation principles of a philosophy of Total Quality, which replaced the acceptable quality attitudes of the past, which is considered the key to survival in the contemporary world-class competitive environment.

4. Theoretical implications

- The scarcity of studies that deal with the resource consumption accounting as a new managerial accounting method, the scientific library need to further studies about it.

- This study is one of the first studies according to the researcher's knowledge which is looking at the effect of the integration between Total Quality and resource consumption accounting on strategic cost management, this study will be an addition to existing studies to enrich library scientific research as a contribution to researchers and a guide for further research in this field.

5. Field implications

- This study encourages the application of the RCA system which has the ability to track, maintain, and group the most detailed information and to effectively integrate operational/logistical and monetary information for management.

- Industrial companies who suffer from the limited resources and possibilities can benefit from this study of the application of systems that help them to optimize the use of resources, develop their resources and use them efficiently and effectively.

- This study shows decision-makers the importance of the principles of total quality and the importance of measuring quality costs which will enhance productivity and decreasing costs.

- The importance of studies to explain the problems of traditional methods and the benefits of modern methods to convince industrial companies to abandon traditional methods and keep pace with development.

6. Recommendation:

1- The need for seminars on the importance of cost information and management accounting and its role in industrial companies in particular under the circumstances of uncertainty and the importance of information at the present time.

2- The need to develop the cost systems currently used for its inability to provide accurate information and replace them with modern systems that keep up with development and suit the Sudanese industrial environment.

3- The need to train and qualify accountants and develop them and encourage them to develop their abilities and skills.

4- The importance of the report on the cost of quality, even if only visible costs, which can be estimated so that it can be managed properly.

5- The need to investigate the reasons for the use of industrial companies to the traditional methods of cost, despite the development and despite that it doesn't provide adequate information.

6- The importance of identifying idle capacities and good management of it, so that companies can optimize the exploitation of their resources.

7- The need to follow developments in the field of costs and accounting management in industrial companies globally and try to adopt what suits them locally.

8- The production of high-quality products means increasing the cost of production and here shows the importance of applying the principles of total quality that reduce the cost of quality.

7. Limitations and Future researches:

- The sample included many food industry types, which vary in their development, production systems and cost systems used, thus future research can test these variables in a specific sector of food industries.
- This study examined Total Quality by four dimensions (Customer focus, Management commitment, Continuous Improvement, Fact based decision making) as the most widely agreed dimensions among researchers, while other dimensions were not taken into consideration, therefore, future research can measure these other dimensions.
- This study focused on the effect of the integration between Total Quality and resource consumption accounting on strategic cost management, while future studies could examine the possibility of applying of resource consumption accounting on Sudanese industry, or to measure implementation of Strategic Cost Management.

8. Conclusion

The purpose of this research was to test the effect of the integration between Total Quality and resource consumption accounting on strategic cost management. To achieve this objective, it was necessary first to hypothesis theses causal relationships and second to empirically examine the relationships. The study was conducted through the distribution of a questionnaire on a sample of the food industry companies in Khartoum, employed non-probability a purposive sampling, research model and hypotheses were tested with AMOS SEM (Structural Equation Modeling). The results of this study revealed that most (78%) of food manufacturing companies in Sudan implemented traditional costing system, and this study found that the integration between Total Quality and resource consumption accounting have a significant effect on strategic cost management.

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APPENDIXES

Appendix1: Research Questionnaire

SUDAN UNIVERSITY OF SCIENCE AND TECHNOLOGY

COLLEGE OF GRADUATE STUDIES

Subject: Questionnaire

Dear Sir

The researcher studies **The Effect of Resource Consumption Accounting and Total Quality principles in the Fulfillment of Strategic Cost Management**. A field study on a sample of food industry companies in Sudan as part of the requirements of scientific research for obtaining the degree of Ph.D. in accounting. To complete the field study which requires obtaining a set of data to complete the research We thank you for the good cooperation in responding honestly to the questions of the questionnaire, with the assurance of our commitment and concern to ensure the confidentiality of the data and use it for Scientific research purposes only.

Thank you for your co-operation in completing this questionnaire

Researcher:

Linda Oleish AwadAlla

Tel. 0915408003

Section A: Demographic Data:

Please tick (√) in front of the appropriate answer to you

1/ Age:

Under 30 years (), 30 Less than 40 years (), 40 Less than 50 years (),

Over 50 years ()

2/ Educational Qualification:

Bachelor's degree (), Higher Diploma (), Master's degree (), Ph.D. (

), Other ()

3/ Specialization:

Accounting (), Cost (), Business Administration (), Economy (), Other ()

4/ Professional qualification:

SCCA (), AFAA (), ACCA (), CPA (), Other ()

5/ Job title:

Financial Accountant (), Cost Accountant (), Financial Manager (),
General Manager (), Other ()

6/ Years of Experience:

Less than 5 years (), 5 Less than 10 years (), 10 Less than 15 years (),
more than 15 years ()

Section B: enterprise data

Please tick (√) in front of the appropriate answer to you

1/ Age of the institution:

Less than 5 years (), 5 Less than 10 years (), 10 Less than 15 years (),
more than 15 years ()

2/ The markets in which the institution operates:

Local (), regional ()

3/ Number of users in the foundation:

10 Less than 50 users (), 50 Less than 100 users (), 100 Less than 150
users (), more than 150 users ()

4/ The cost system applied by the foundation:

Traditional System (), ABC system (), RCA (), Other ()

Section C: Measurement of Study Variables

Please tick (√) in front of the appropriate answer to you

The First Variable: Resource Consumption Accounting

	Frist Dimension: The Nature of Resources	Approval level				
		Strongly Agree	Agree	neutral	Disagree	Strongly Disagree
	Statements					
1	The Foundation specifies a comprehensive vision of resources					
2	The cost accounting system in your foundation uses specific cost centers					

3	Activities in your foundation are classified as productive, unproductive and idle					
4	The accounting system in your foundation shows the relation between the resources and the cost objects that consume these resources					
5	Detailed analysis of your foundation resources helps managers gain a better understanding of their strategic decisions					
	Second Dimension: Quantity structure for resource consumption	Approval level				
1	your foundation, creating cost structure using operational quantities					
2	The causal relationship between resource consumption and cost distribution is determined by quantities					
3	your foundation measures the expected output of resources quantitatively					
4	The foundation's cost accounting system provides the ability to manage resources					
	Third Dimension: Recognizing the essential nature of costs	Approval level				
1	Your foundation adopts the standard costing system, rather than the actual costing system					
2	The foundation distinguishes carefully between variable and fixed costs and their use in the decision -making process					
3	The foundation's accounting system uses the replacement cost instead of the historical cost of the depreciation calculation					
4	your foundation cost system determines unused resources and specifically calculates idle capacity					
5	A clear distinction is made between the initial costs (costs directly consumed in the production of the intended outputs) and the secondary costs					

The Second Variable: Total Quality Management

	First Dimension: Management commitment	Approval level				
	Statements	Strongly Agree	Agree	neutral	Disagree	Strongly Disagree
1	Management takes responsibility for quality performance					

2	The Foundation publishes, disseminates and defines the overall quality policy and its objectives in order to increase the awareness of its employees					
3	Management provides incentives to achieve quality objectives					
4	The foundation makes the regulations determine authorities and the allocation of responsibilities					
5	The foundation reviews the TQM periodically					
	Second Dimension: Employee empowerment	Approval level				
1	Foundation creates an environment for employees, dominated by participation and self-confidence cooperation					
2	The Foundation encourages employees to initiate improved performance					
3	The Foundation works to develop the skills of employees by subjecting them to training courses					
4	Management uses good performance as an incentive to recruit and retain employees					
5	There are no communication barriers between departments in the institution					
6	Contact operations not only "top-down" but "bottom-up" also					
	Third Dimension: Fact-based decision making	Approval level				
1	The foundation takes into account realism in decision-making					
2	your Foundation involves workers in the decision-making in order to adopt and implement it					
3	Quality observations data is used to manage quality initiatives					
4	Quality-related data in your foundation are collected well					
5	A set of scientific and statistical tools is used to make decisions, develop strategies and monitor them					
	Fourth Dimension: Customer focus	Approval level				
1	We take guarantee Customer satisfaction is					

	our main responsibility					
2	We use customer complaints as an input to improve our operations					
3	our customer satisfaction is linked with internal performance indicators					
4	We determine the satisfaction of our customers compared to the customer satisfaction of our competitors					
5	The relationship between the enterprise and the suppliers is based on common interests					
	Fifth Dimension: Continuous Improvement	Approval level				
1	The quality initiative is a continuous process					
2	We emphasize continuous improvement of quality in all business processes					
3	The Foundation makes an effort to prevent errors during the process planning phase					
4	Continuous improvement exceeds short-term results					

The Third Variable: Strategic Cost Management

	First Dimension: Strategic Position	Approval level				
	Statements	Strongly Agree	Agree	neutral	Disagree	Strongly Disagree
1	The institution has strategic objectives					
2	The capabilities and possibilities of the company are determined					
3	There is an analysis of the internal and external environment of the foundation					
4	The strengths and weaknesses of the foundation are analyzed					
5	Competition strategies are defined, applied and evaluated on an ongoing basis					
6	Human resources are qualified and resources are provided for continuous improvement					
	Second Dimension: Value Chain Analysis	Approval level				
1	The foundation determines the activities it undertakes to produce the product					
2	The cost drivers for each activity are determined					
3	The relative importance of each activity is determined by the total cost of the product					

4	The relationship between activities is determined					
5	The foundation determines activities that add value and which do not add value					
6	There is a department of relations between the various departments within the institution					
7	There are management relationships between the company and both suppliers and customers					
	Third Dimension: Cost Drivers Analysis	Approval level				
1	The foundation converts operations to specific activities					
2	The foundation determines the cost of each activity					
3	The foundation determines the cost of each activity					
4	The organization distributes the costs of activities on products according to the amount of products consumed by the activities					
5	Activities that do not add value are identified until they are disposed of					

Appendix 2: List of Reviewers

No.	Name	Academic position	University
1	Abd Elmajid Abdullah Hassan	Professor	Omdurman Islamic
2	Abdelaziez Abdelraheem	Professor	Al-Neelain
3	Mustafa Najm Al – Bishari	Associate Professor	Sudan university of science & technology
4	Siddiq Bllal	Associate Professor	Sudan university of science & technology
5	El Hahdi Adam	Associate Professor	Al-Neelain
6	Abd Elrahman Al Bakri	Associate Professor	Al-Neelain
7	Mohamed Hassan Azraq	Assistant professor	Sudan university of science & technology
8	Ismail Osman Alnajib	Assistant professor	Sudan university of science & technology
9	Zuhair Ahmed Ali	Assistant professor	Sudan university of science & technology
10	Eltahir Ahmed Mohamed	Assistant professor	Sudan university of science & technology
11	Mustafa Mohammed Mohammed Saleh	Assistant professor	Director General of the Ministry of Industry