ROYAL INSTITUTE
OF TECHNOLOGY

STUDENT THESIS

Master of Science in
Project Management and Operational Development

TOPIC: *Critical Success Factors: Telecommunication Network equipment Procurement projects. A case study of* **MTN Nigeria***.*

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Dedication.

To my wife Joy Kejuo and our three wonderful kids,

Michelle, Nathan and Nicole

Abstract

Procurement of network equipment constitute a major part of mobile telecommunication business. These equipments are very expensive and purchasing them require the establishment of a sound process in the execution of procurement projects. Most equipments are procured to catch up with technological innovations, competition, customer pressure for quality services, etc.

This research examined the critical factors that a project manager need to look out for when undertaking a telecommunication network equipment procurement project in Nigeria, using MTN Nigeria as case study. Eleven critical success factors were identified and ranked in order of importance:

1. Supplier Process and Time,
2. Price
3. Technological standard
4. Relationship with Supplier
5. Top Management support
6. System training and documentation
7. System integration
8. Security
9. Change management
10. Performanace measurement
11. Risk

The process of conducting procurement was also examine and a new process suggested.

Table of Content

1. Introduction

Since the middle of the last century, many organizations are using project management approach to bring about the change needed to meet organizational goals and objectives. Around the world, it is difficult to find two project management situations that are the same. This is partly because every project, be it internal or external, offshore or onshore, carried out by an organization is unique, with its own unique set of challenges. Organizations initiate projects with the best of intentions to succeed. But due to complex nature of project activities, and the challenges associated with managing a project restriction or constraints of budget, quality and time are also unique and ever changing. The management of project constraints explains, if not fully, why many projects fail.

Like any other organizational endeavors, projects are part of a wider super-system of an organization and are also influenced by both internal and external forces in a super system. Some external forces like government regulations, environmental forces, society, pressure groups, financial markets, labor markets, technology, customer influence, shareholder etc. are very dynamic and much erratic. Internal forces also like changes in operating processes, management style, resources allocation, skills, internal conflicts etc. are becoming more adaptive to the external environment. Hence, managing projects in this mix of dynamic factors requires a lot from project managers and also show how easy it is for a project to fail.

The above scenario has led to assumptions by many project management professionals in many industry sectors that if project and line managers can identify what constitute a project success and the factors that determine a successful outcome of a project, they can improve their performance Erling *et al* (2006). However, identifying those factors that can make a project succeed is difficult and cumbersome. Erling *et al* (2006) stated that there are no clear proof linking a project success factor and actual project success. Again, different industry sectors have their own perception of success and failure, and what factors can contribute to either.

The information technology (IT) sector is the most dynamic and innovative sector. New technologies are coming up and competing among themselves. The telecommunication industry which constitutes a big part of the IT industry is always at the center of these technological changes, hence, have to deal with repeated processes of procuring new equipments and materials for their operations. Zhu et al (2009) pointed that equipment procurements are frequent and how to optimize procurement decisions to reduce relative

costs is critical for their cost strategy and development. Therefore, procurement projects have become a center piece of telecommunications projects management.

This thesis work is set to identify those factors that make network equipment procurement projects succeed in a telecommunication firm, using MTN Nigeria as a case study.

MTN Nigeria Basic Information

MTN Nigeria was launched in august 2001 as part of MTN Group, South Africa. MTN Group is a multinational telecommunications company offering mobile communication and related products and services to individuals and business. MTN Group operates in three continents, Africa, Europe and Middle East, with a subscribers base of over 164,5 million. Its largest markets are in Nigeria, Iran, Ghana and Syria. 2011 total revenue reach R 121,9 billion (south africa's currenecy) and spent over R 17,7 billion on network infrastructure. The Nigerian subsidiary, MTN Nigeria has a subscribers base of 41, 641 million and controls 50 percent market share . Its major competitors include Globacom, Airtel, Etisalat and Mtel.

Adopted from MTN Group 2011 annual report. (37)

1.1. Objective

The key objective of this thesis is to identify key procurement project management success factors that can help project managers succeed in the execution of their projects in telecommunication network equipment procurement. In line with the above objective, this work will also seek to rank the critical success factors in their order of importance.

1.2. Statement of Problem

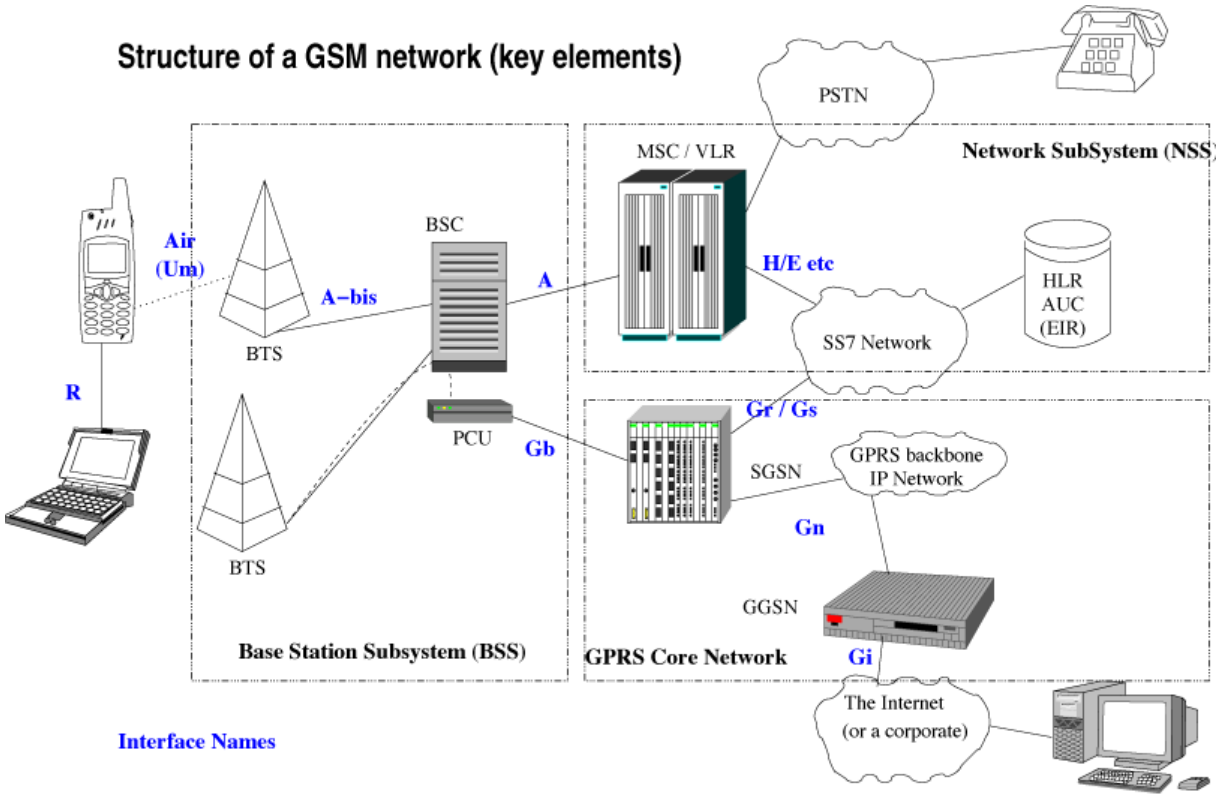
Many projects around the world keep failing, resulting in loss of millions of dollar for organizations. This persisting challenge has led many project management professionals to attempt to identify the critical factors that need to be tackle head-on to produce a successful project management outcome. There exist literatures on critical success factors for specific industry sectors, or specific country situation, and very little empirical research on critical success factors for specific

organizational operational unit, like procurement department, network roll – out department etc. In some instances, a few literatures exist on the critical success factors of a project management on a particular part of the project life cycle, like risk management, planning, etc., but rarely on procurement management. This has inspired me to carry out preliminary research on identifying the most critical success factors that need to be managed carefully during telecommunication network equipment procurement project management in MTN Nigeria.

1.3. Scope

This thesis work is focused mainly on identifying the critical success factors that affects the success or failure of telecommunication network equipment procurement project management in MTN Nigeria.

Sample of Base station network Equipment. Adopted from (38)



Abbreviations:

AUC-- AUthentication Center
BSC --Base Station Controller
BTS --Base Transceiver Station
EIR --Equipment Identity Register
HLR --Home Location Register
MS --Mobile Station
MSC --Mobile services Switching Center
NMC --Network Management Center
OMC --Operation and Maintenance Center
VLR --Visitor Location Register

Diagram adopted from (39)

2. Research Methodology

This thesis is aimed at identifying the critical success factors for a telecommunication network equipment procurement project management using quantitative statistical method and, a qualitative case study of MTN Nigeria. The main resources consist of information gathered from MTN Nigeria. Other telecommunications company's professionals especially from direct competitors of MTN Nigeria were contacted for their inputs.

The study focuses only in network equipment procurement, involving staff of project management, network roll-out, and procurement departments at MTN Nigeria, as well as other key staffs, from transmission, and contract management involved in the network equipment procurement projects. Direct telephone interviews were used to gather information due to the sensitive nature of this subject, and fear of passing information to competitors, as well as literatures from MTN Nigeria. A standard questionnaire was administered to other respondents via telephone, using confidential contact information obtained from the companies. The findings from the case study are benchmark with PMBOK. The next section will begin with a review of relevant literatures, followed by data collection and analysis, research findings, conclusion, recommendation and appendix.

3. Review of Literatures

The dynamic nature of the global business environment, uncertainties in political environments, rapid technological advancements, financial markets instability, budgets and development struggle creates a very difficult scenario for project management professionals to achieve desired outcome when they execute projects. Project management is now more difficult than previously anticipated in all industry sectors, which makes it much difficult and complex to define the term "SUCCESS". The factors to measure success are even unpredictable because of the unprecedented changes which project manager's faces. According to Salleh (2009), the study of project success or failure and critical success factors is a means of understanding and improving the project management process.

This section will review literatures that will provide the understanding and explanation of critical success factors in project management. The literature review will include Project success factors, Critical success factors and Procurement management.

3.1. Project Success

The definition of project success is ambiguous, Salleh (2009). PMBOK 4th edition (2008) stated that a project is successful if it achieves the triple objective outcome of within time, scope, and quality. This is the traditional view of project management as used by Munns and Bjeirmi (1996). It implies the successful achievement of time, cost and quality objectives, as well as the quality of the project process, Erling et al (2006). Turner (2004) identifies on time, within budget and to specification especially for information technology projects as the standard for judging success. Erling et al (2006) stated that overall project success deals with the wider and longer term impact of the project, which means both project management success and project product success. They noted that project management can be determined at the end of the project, which means in many cases, success criteria will be determine months or years after finishing the project, especially public projects. Hence, determining if a project is successful is difficult if viewed from the above two success criteria, Erling et al (2006).

Baccarini (1999) use the concept project success in a different approach, viewing it as product success, which implies the quality and impact of the end product to the end user (in terms of satisfaction of user(s) needs, meeting strategic organizational objectives, satisfaction of stakeholders' need) when a project execution is finished. Ashley et al (1987, p 71) defined

project success as the "results much better than expected or normally observed in terms of cost, schedule, quality, safety and participant satisfaction". In their work, Baker et al (1988) defined project success to include technical performance and satisfaction among various key people on the project to clients, project team and users. Power and Dickson (1973) mentioned in their work on managing information systems projects that time, cost, user satisfaction and the impact on computer operations.

However, Lim and Mohamed (1999) cautioned that project managers should not only look at project success as the achievement of some predetermined project goals, like time, cost, performance, quality and safety, but also consider the users who do not have similar pre-determined goals regarding the project at all. Hence, the expectation on the outcome of the project and the perception of project success or failure will be different for everyone, Lim and Mohamed (1999). The above literatures points to Steinfort (2011, p.3) conclusion that "success needs to be investigated from the perspective of active project team stakeholders as well as from that of their client/benefit recipients and in the theoretical and empirical/practical review of critical success criteria and factors on any project".

3.2. Critical Success Factors (CSFs)

Many studies have been conducted over the years to determine which project management success factors influences success. Fortune and White (2006) stated that there is a clear lack of consensus between researchers and authors regarding what factors affect project success. Baccarini (1999) and Liu and walker (1998) agree that defining critical success factors for a project is contentious and intricate.

Critical success factors concept was developed by Daniel (1961) about the how to manage information systems crises, and was further developed by Rockart (1979) on his work by identifying the use of critical success factors to create competitive advantage, Barbara (2010). Remus (2007) noted that the strength of critical success factors is through their identification and confirmation through working with senior management teams other teams close to the work on how to involve and concentrate on key design features for success. Zwikael and Globerson (2006) describe critical success factors the main reasons responsible for project failure or success. They identified that project failure is still very high because critical success factors are rarely specific enough for project managers to act on. Erling et al (2006) defined critical success factors as "those features which have been identified as necessary to be achieved in order to create excellent results: if the critical success factors are not present or

taken into consideration, one can largely expect that problems will be experienced which act as barriers to overall successful outcome".

Anderson and Jessen (2000) stressed the need to separate the actual task and people oriented issues while evaluating project results. They identified critical success factors based on a step-wise structure, reflecting progression through a project. They covered: Scope (Project mission and goals, terms of references), Planning (Planning at global level, planning at detail level), execution (activities, decisions), and control (financial and technical control, internal and external communication). Belassi and Turkel (1996) grouped the critical success factors into four areas: the project (e.g. size, uniqueness, urgency etc), the organization (structure, management support), the external environment (technological, financial, political) and the project manager and his team (background, skills). Cooper and Klienschmidt (1996) focused on the identification of critical success factors for new product development, including a defined strategy and adequate research and development spending.

Pinto and Slevin (1987) demonstrated how to use critical success factors to diagnose a projects status. Westerveld (2003) uses foundation for quality management model to categorize critical success factors; leadership and team, policy and strategy, stakeholder management, contracting, resources, and product management. Barbara (2010) used a multi – method to identify critical success factors for projects and classified them as: People (right mix of people, in terms of skill-based, role, and the type of people), Process (short-time-span, tight dateline, time for celebration, use of practice run), Task (meaningful and real, well, client accessible, well defined), and Location (appropriate venues with range of facilities). Lester (1998) found a different set of critical success factors, senior management commitment, organization structure and risk management.

According to Fortune and White (2006), there is a clear lack of consensus between researchers regarding what factors affects project success. The disagreement is further hardened by the dynamic nature of the business environment as it tries to adapt to fast changes in technology. Below is a tabular presentation of critical success factors from several researchers.

3.3. Critical success factors for Procurement Projects.

Zhu et al (2009, p. 1) stated that:

" *In the trend of convergence and transformation, telecom companies are presenting more investment demand for updating networks or deployment new technologies, and that will need more equipment procurements, result in large amount of procurement costs. Then how to optimize procurement decisions to reduce relative costs is critical for telecom companies' development, especially in the circumstance of financial crisis."*

PMBOK (2008), Kerzner (2009) and other literatures have written on procurement management within a project and as a project. Below is a summary of a few literatures about critical success factors for procurement projects:

No	Study	Context	Identified CSF
1	Panayiotou et al (2003)	Maximazing possibilities of a successful procurement implementation	1. Efficient processes 2. Monitoring & evaluation systems 3. Training
2	Klafft (2009)	Success factors and technology acceptance	Trust-building measures for partners.
3	Quayle (2005)	Business issues affecting e-procurement implementation in SME	1. Leadership 2. Strategy 3. Marketing 4. Waste reduction 5. Financial management 6. Staff development 7. Supplier development
4	Vaidya et al (2006)	Evaluation of e-GP CSFs from implementation and project outcome perspective	1. Security and authentication 2. Syetems and technology 3. Supplier adotion 4. Technological standards 5. User uptake and training 6. System integration 7. Top management support 8. Business case/project mgt 9. Change management 10. Re- engineering of the process 11. Performance measeurement
5	Khanapuri et al (2011)	Factors that can provide impetus to e-procurement implementation in India	1. Cost savings 2. Centralization of procurement 3. Re-engineering of process 4. Budgetary control 5. Supplier management 6. Changement management

			7. Knowledge pool 8. Maturity of market place 9. Legal framework.

Table. 1. **Critical success factors from selected literatures**. *Adopted from (20)*

4. Data Collection and Analysis

4.1. Data Collection Method

Data collection is a vital part of most scientific research. In this thesis, data was collected from MTN Nigeria as a case study through direct interview based on standard questions formulated to cover network equipment procurement and critical success factors of projects in MTN. A questionnaire was designed to collect information from other mobile telecommunication operators in Nigeria. The questionnaire contain a set of simple and straight forward questions whose purpose is to collect particular data and information. This provides the basis to identify the critical success factors.

4.1.1. Sample Definition

In a study of this nature, it is vital to define the samples. Samples is were considered based on the following criteria;

a. Has been involve in a procurement project management within the last three years
b. The respondent is involved at least at one stage of the equipment procurement process.
c. Currently works in the any of the Nigerian mobile telecommunication companies. Current position of the sample and experience.
d. Repondents were draw from the following departments:
    1. Project management
    2. Procurement
    3. Transmission
    4. Network Roll-Out (equipment installation and testing)
    5. Contract management.

4.1.2. Questionnaire Design

The design of the questionnaire is very simple and direct to enable the respondents understand what is required of them. The questionnaire contains three sections:

a. **Personal Information**: This part consist of general information that shows the respondents background.
b. **Critical Success factors for projects**: This part investigates the critical success factors the respondent identifies.

c. **Critical success factors ranking:** Here the respondents will rank the factors they have identified using a given scale.

4.1.3. Survey Procedure

The questionnaire was administerd via telephone, because of the reasons stated in the methodology, as well as the business nature of respondents schedules. Again, Bryman and Bell (2003) stated that there is increasing evidence the response rate of online survey is declining and it takes longer time to get response from respondents. In Nigeria, internet access is still limited, most respondents dont have time at work to answer questionnaires, and dont have internet access at home to do that at thier free time. Using direct telephone contact to complete questionnaires is expensive, but produces fast response from respondents, who are most times more willing to talk on the phone than to open a webpage to complete a survey.

4.1.4. Data Collected

Table 2. MTN NIGERIA (through direct telephone inteview) *see appendix 1. for details*

Department	No. of Respondents
1. Project management	5
2. Procurement	8
3. Transmission	3
4. Core network	3
5. Contract management	2
Total	**21**

Table 3. OTHER TELECOMMUNICATION OPERATORS IN NIGERIA (via telephone) *appendix 2*.

Department	No. of Repondents			
	Globacom	Airtel	Etisalat	Mtel
1. Project Management	4	5	7	3
2. Procurement	6	4	6	5
3. Transmission	3	1	4	2
4. Core network	3	5	3	4
5. Contract Management	2	4	2	3
Sub Total	18	19	22	17
Total	**76**			

4.2. DATA ANALYSIS METHOD

The collected data where analyzed using frequency analysis and presented using frequency histograms. This method is choosen due to the nature of the data, and to make it easy for interpretation and understanding.

4.3. DATA RELIABLITY.

The data used is collected from individual project management professionals, who provided answers to the questiones based on thier personal understanding and experience. This will likely differ from person to person. However, to test for internal consistency, **Cronbach alpha** (*see wikipadia for full details*) was used with IBM SPSS software. The alpha was **0.785,** which shows a good consistency in the data. Cronbach alpha lies between 0 and 1, with a value greater than 0.6 considered good.

Reliability Statistics

Cronbach's Alpha	N of Items
,785	14

(See appendix 4 for details)

5. Research Findings

5.2. MTN Nigeria Current Procurement Process showing Departments involved.

Undertaking a network equipment procurement project in an organization like MTN Nigeria requires the involvement of several departments. This also varies from project to project depending on which department needs the equipment. But the main process remains similar. Figure 1 below is a flowchart which shows the current MTN Nigeria Base Station equipment procurement process and departments involved in the process.

The departments involve includes:

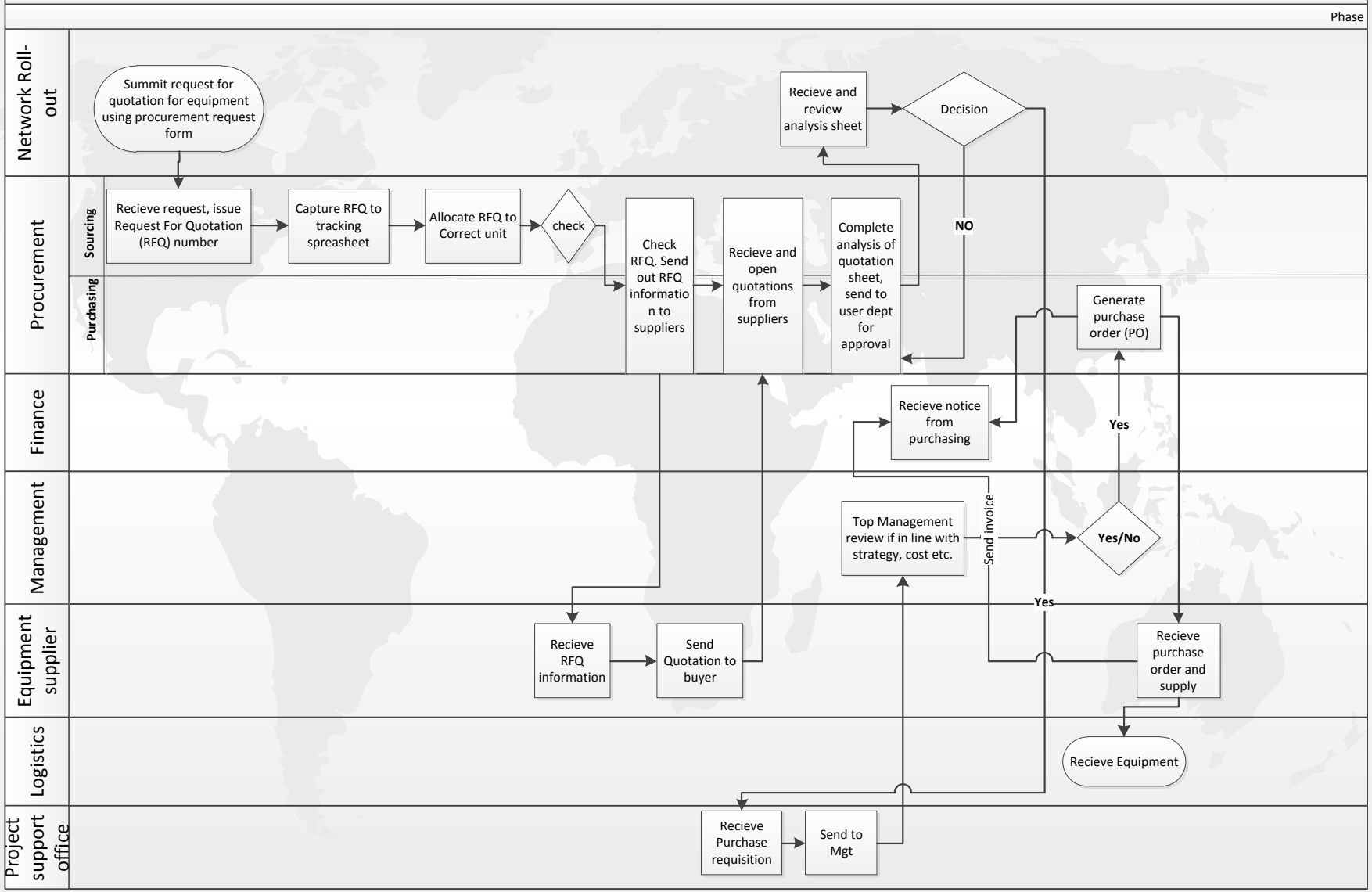
a. Network Roll-Out
b. Procurement
c. Finance
d. Top management
e. Logistics
f. Project Support Office (PSO).

a. ***Network Roll-Out***: Define the specification, quality and type of equipment required and where it will be needed in line with existing network structure.
b. ***Procuremen***t:
    1. Collect and study the specifications from the network roll-out team.
    2. Initiate contact with suppliers and issue Request for Quotation (RFQ),
    3. Conduct supplier selection process
    4. Conduct detailed analysis of RFQ and provide details to the user department
    5. Conduct the purchasing of the actual equipment from the supplier.
c. ***Finance***: Collect details of the transaction from procurement and process invoice from the supplier(s). Working with management on budget issues.
d. ***Top management***: Review procurement request, checking the organisation budget, if the project is in line with current strategy and any other requirements, as well as giving approval to the project or reject the request.

e. ***Logistics***: Recieve supplied equipments, confirm thier status to procurement, and manange the inventory.

f. ***Project Support Office***: Acts like the project office to cordinate all projects, provide project plan for each project, as well as working with management to ensure that every project is in line with current management startegy.

Figure 1. Base Station Equipment Procurement Process for MTN Nigeria, (*showing the Departments Involved)*.



5.2. MTN Nigeria procurement projects Critical success factors

Project critical success factors are the vital ingredients for a project to succeed. In the literature review, many authors have written on the importance of identifying a project critical success factors, if the factors are manage well, the chances of the project success is very high. MTN Nigeria have identified many critical success factors for network equipment procurement projects, which are listed below:

1. *Supplier Process and Time*
2. *Price*
3. *Technological standard*
4. *Relationship with Supplier*
5. *Top Management support*
6. *System training and documentation*
7. *System integration*
8. *Security*
9. *Change management*
10. *Performanace measurement*
11. *Risk*

Respondents of the questionnaire where asked to rank the factors, using 1 as the top-most (Highest) factor to be considered in equipment procurement projects. The result is shown below:

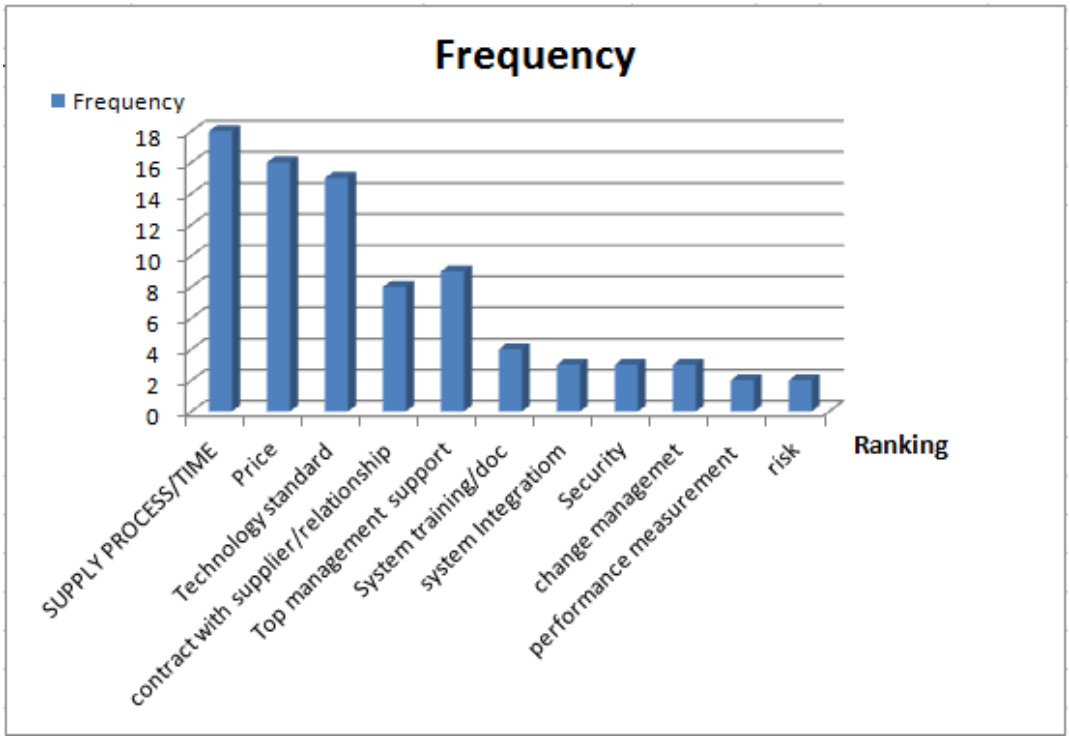


Figure 2. *MTN Nigeria critical success factors ranking. Details in appendix 1.*

5.3. Critical Success factors as identified and ranked by other mobile telecommunication operators in Nigeria.

The competition in the Nigeria Mobile communication market is very strong. Every operator is positioning to get a good market share and maintain or increasing that market share. Currently Nigeria have six major GSM mobile operators; MTN Nigeria, Globacom, Airtel, Etisalat and Mtel. Equipment procurement for expansion of network is also influnced by this strong market competition, hence, the input of other GSM mobile operators was vital to see other professionals opinion. Below is a summary table of identified critical success factors and thier ranking. There seems to be much similarity with the table for MTN Nigeria, except the number of respondents.

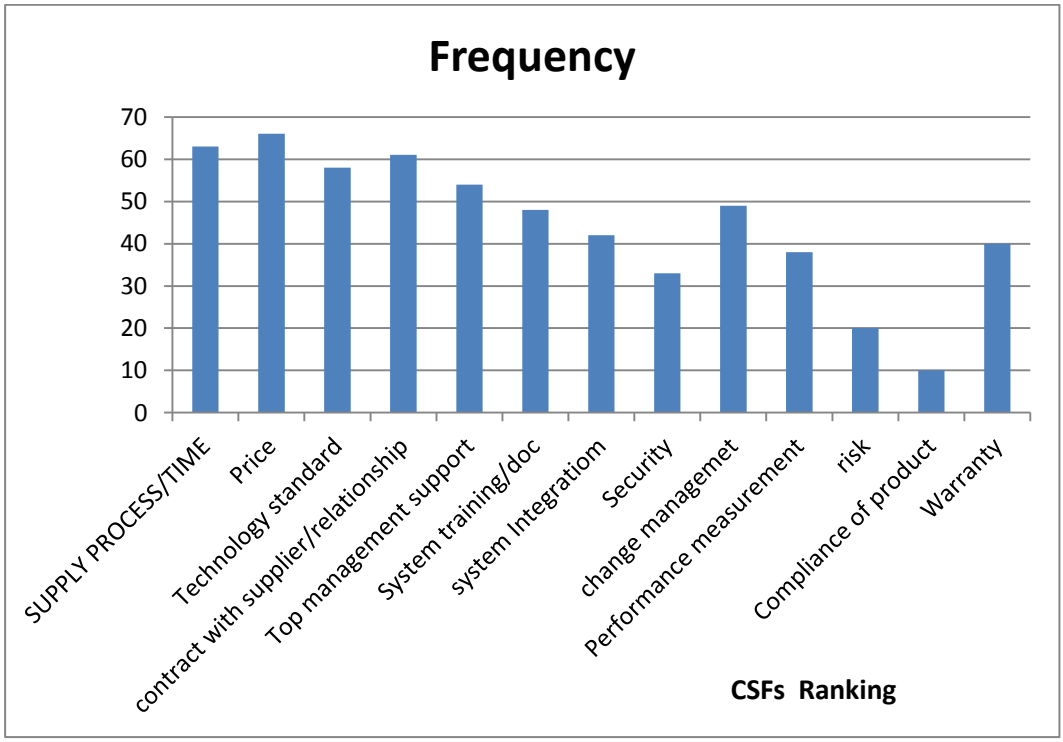


Figure 3. Other Operators identified critical success factor. Appendix 2.

5.4. PMBOK procurement Model

In the research methodology, the PMBOK 4th edition was selected to be used as a benchmark with the procurement process adopted by MTN Nigeria. Figure 4 below shows a brief summary of the model recommended by PMBOK for procurement process management.

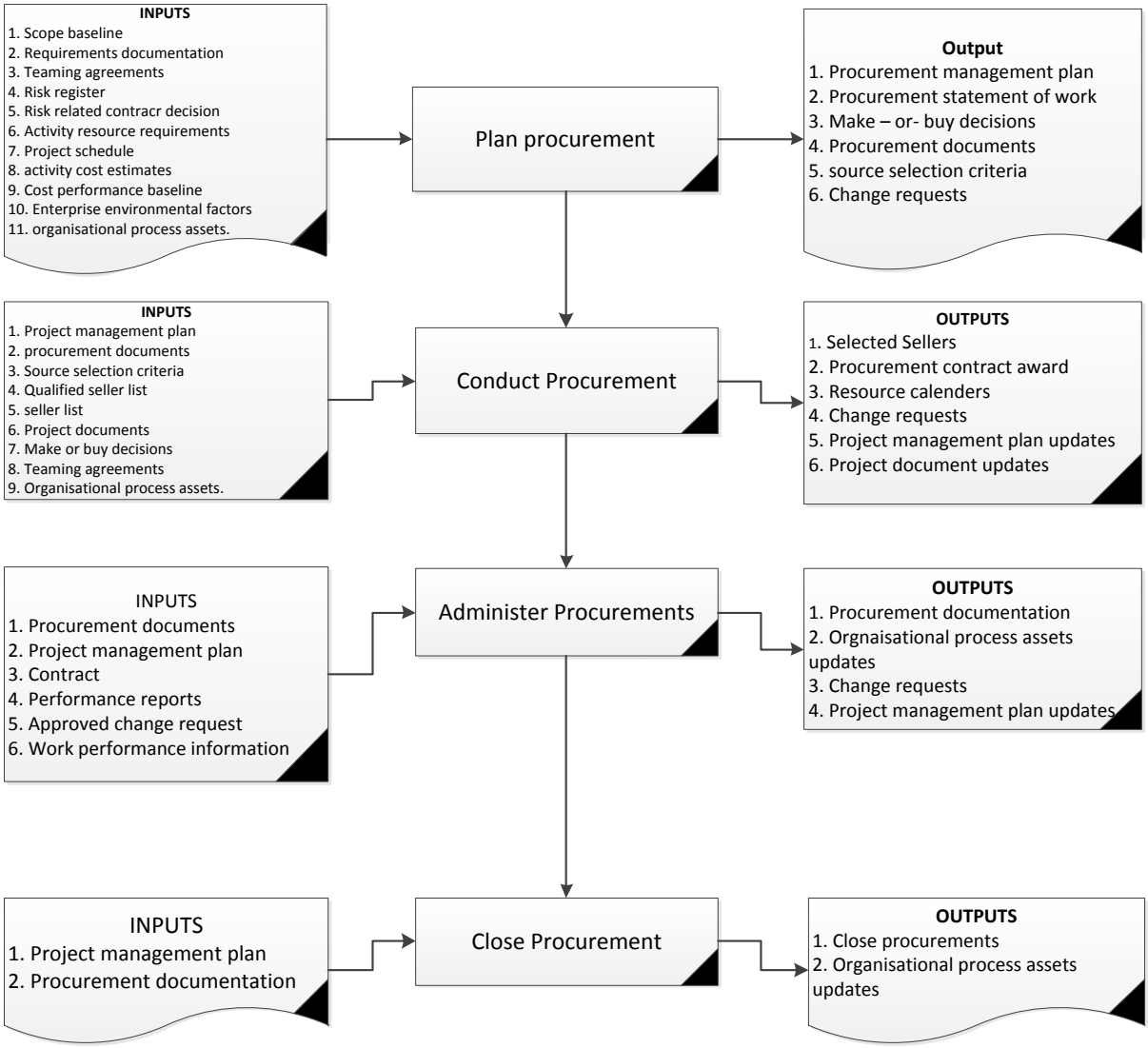


Figure 4. Project procurement managemet method. Source, PMBOk 4th Edition (20)

6. Analysis of Research Findings

The Nigerian business environment is very unique and complicated in many respects. Many organisations work under pressure from divergent business and environmental factors. MTN Nigeria is one of them. Thier procurement process as shown above is carefully built to follow the recommendations of the PMBOK in conjunction with the local business environment. Other telecommunications operators seems to identify similar critical success factors, except taking pricing as the number one factor of influence. The purpose of the research is to identify, from the point of view of MTN Nigeria, the critical success factors a project manager need to watch out carefully while executing an equipment procurement project, as well as rank them in order of importances. Table 2 below shows the factors which the respondents identified and thier ranking.

Critical Success Factors from MTN View	Thier Ranking (1 = Top Most)
Supplier Process/Time	**1**
Price	**2**
Technology Standard	**3**
Top management support	**4**
Contract / Relationship with supplier	**5**
System training/documentation	**6**
Security	**7**
Change management	**8**
System Integration	**9**
Performance management	**10**
Risk	**11**

Table 2. MTN Nigering ranking of Critical Success Factors.

a. ***Supplier Process/Time***:

"Delivery time is defined to be the elapsed time from the receipt of an order by the originating supplier in the supply network to the receipt of the product ordered by the final customer in the supply network. Delivery time is composed of a series of internal (manufacturing and processing) times at each stage plus the external (distribution and transportation) times found at various stages of the supply network"(40)

Procurement time is a very critical factor in procurement projects. It includes a range of sub-factors to be tackled like; Lead time, proper packaging, insurance coverage, customs requirement, project schedule required delievery dates, etc. (41). Supplier process and delivery time is the most critical factor for MTN Nigeria because procurement projects are mostly sub-projects of a bigger project. Hence, the procurement timing must correspond to the entire bigger project schedule and plan. Suppliers have different order processes, which are mostly different from the customer's process. Delivery time of the procured equipments is vital to fit with the entire bigger project plan. Equipment suppliers are scattered around the world, and delivery time also differs.

b. ***Price***:

"The reality is, when building an IT network, about 20% of the budget goes to acquiring the hardware and 80% goes to operating costs. But saving money on that 20% up front can be more than offset by increases in the 80% if, for example, there are higher integration costs, more downtime or serious security breaches. The network that you considered "good enough" to handle your current business requirements may not be "good enough" to handle your future ones". (42)

According to PMBOK 4th edition, organisations use different pricing techniques to achieve good value. But it also depends on the circumstance and situation at hand, there will usually be a trade-off between quality, quantity and price in procurement. The difficulty is lies in balancing the trade-off as well as achieving great value for money. The above quotation illustrates this struggle in telecommunication companies. Naturally, business wants quality product at a cheaper rate. Organisations that can

supply products at a cheaper rate and good quality stands to gain a good market share. MTN Nigeria uses request for quotation (RFQ) and other methods to gain a better price for thier equipments. This is the second most critical factor.

c. ***Technology Standard***:

”*Technology can contribute to the success of mobile network projects and neglecting these factors may cause problems such as lack of flexibility, synchronization, and local decision-making authority,.... Effective technological choice can explain the failure or success of mobile network projects. Technological choices are studied according to strategic and functional perspectives. From the strategic perspective, choices are made according to their degree of process transformation and modification of existing procedures within the company..... However, from a functional perspective, choices are made according to technical criteria..... Technical choice includes the choice of architecture (data-based or voice-based), software and its package, wireless network and mobile devices”(43)*

Panda and Sahu (2012), identified some sub-factors; Content standards, Technical Standards, Interoperability, process and procedural Standards, and compliance with the standards framework, as vital in selecting new technology. New innovations of products that perform better than the previous versions are being developed. The equipment must be to current standard and trend, with acceptable technical standard, as well as good content. Have good interface design, user friendly, and durable. To meet customers demand and out-do the competition, MTN Nigeria relies on new technological innovations in network equipment that will serve the current organisational and customers demands.

d. ***Top Management support***: The management structure in MTN Nigeria is vertical. Decisions must be signed – off by top management in many cases, because the budget to procure equipment is always enormous. Top management is responsible for setting the goals and objectives of the organisation, guiding those goals to achieve success in the organisation. For any equipment to be procured, it needs management support, otherwise, the project is dead. Hence the success of any equipment procurement

project depends to a large extend on top management to support the project. Panda and Sahu (2012), again identified sub factors to be considered;

1. Approval from top management
2. Allocation of appropriate resources
3. Identification of the project as top priority
4. Understanding of the capabilities and limitations of the equipment
5. Alignment with business strategy
6. Establishment of appropriate work culture (23)

e. ***Contract/relationship with supplier***: Building a strong relationship with suppliers is part of a good procurement process. Over ther year MTN Nigeria have built a strong relationship with some original equipment manufactures, especially Ericsson of Sweden and Huawei of China. In part, they have existing contracts with some suppliers for a duration of time. This relationship enables MTN Nigeria to have confidence on the supplier based on past performance, technology capability, quality of equipments etc, and existing contracts binds suppliers to certain conditions as agreed, despite changes in business environment.

f. ***System training and documentation***: Documentation and user training from suppliers is key for effective usage and maintainance of the equipment even in the long run. The adoption of the a new technology depends to a large extend on the level of training impacted on the end users. Good training will reduce the time wasted to study the manual for efficient usage of the equipment. The main issues to look into according to Panda and Sahu (2012) includes;

1. Training and learning how to operete new equipments
2. Supportive environment
3. Investment in knowledge capital
4. Developing own in-house training
5. Continuous learning and training
6. Understanding how the system will change business processes (23)

g. ***Security***: The security and reliability of an equipment is important in ensuring data and hardware are protected. Good security controls, technical safety, software and hardware reliability, and counter-measures are necessary for reliability.

h. ***Change management***: Change management is vital for users to effectively switch and adopt to the new piece of equipment. If the equipment is too complicated to understand, users will find it difficult to adopt to the change in the new equipment, and a good feedback process and help desk will help. Hence, identification and migration of potential barriers, key stakeholders, and managing organisational resistance is important.

i. ***System Integration***: For MTN Nigeria, the ability of an equipment to integrate with existing systems in real time is very much important. Otherwise it creates loss of revenue in wasted time to configure the system. Sending and recieving information in real time with other systems, information matching, etc is taken into account. (33)

j. ***Performance management:*** Measuring the performance of an equipment is necessary for capability measurement, goals and targets, baseline measurement, key performanace indicators (KPI), and progress monitoring (33). The ease with which a systems performace can be measured is important for MTN Nigeria.

k. ***Risk:*** Most equipment carry a risk part. Ability to withstand environmental and other risk factors will also influence the procurement of that equipment.

MTN Nigeria Project Success Model

Pinto and Slevin (1987) created a model for project management success, which can be used in many cases depending on the variable of interest. Mathematically, they stated the model as:

$$S = f\ (X_1, X_2, X_3, \ldots\ldots\ldots X_n)$$

Where S = project success
X_i = the critcal success factor i.

Applying the above model to MTN Nigeria case, the following model can be formulated:

$$PS = f\ (x_{ts}, x_{sp/t}, x_{pr}, x_{cs/r}, x_{st/d}, x_{tm}, x_{si}, x_{sc}, x_{cm}, x_{pm}, x_{rk})$$

Where **PS** Project Success.

TS Technological standards

SP/T Supply Process/Time

Pr Price

CS/R Contract with supplier/relationship

ST/D System Training/Documentation

RK Risk

TM Top management

SC Security

SI System Integration

PM Performance measurement

CM Change management

The above model can be tested and measured with a good software to accertain individual factor contributions to the project success. This is a subject for futher research and beyond the scope of this thesis.

7. Conclusion

The objective of this work from the beginning was to identify the factors that are so critical for a project manager know in MTN Nigeria while executing a network equipment procurement project. This objective was achieved. Procurement management is an important aspect of project management and MTN Nigeria treats it as such. It is pertinent to mention here that procurement management in MTN Nigeria as well as other telcommunication organisations is treated with top secrecy and used as a tool for competitive advantage. Hence, most of the information collected are treated with strict confidentiality. Getting respondents to answer questionnaires was the most difficult part of this work.

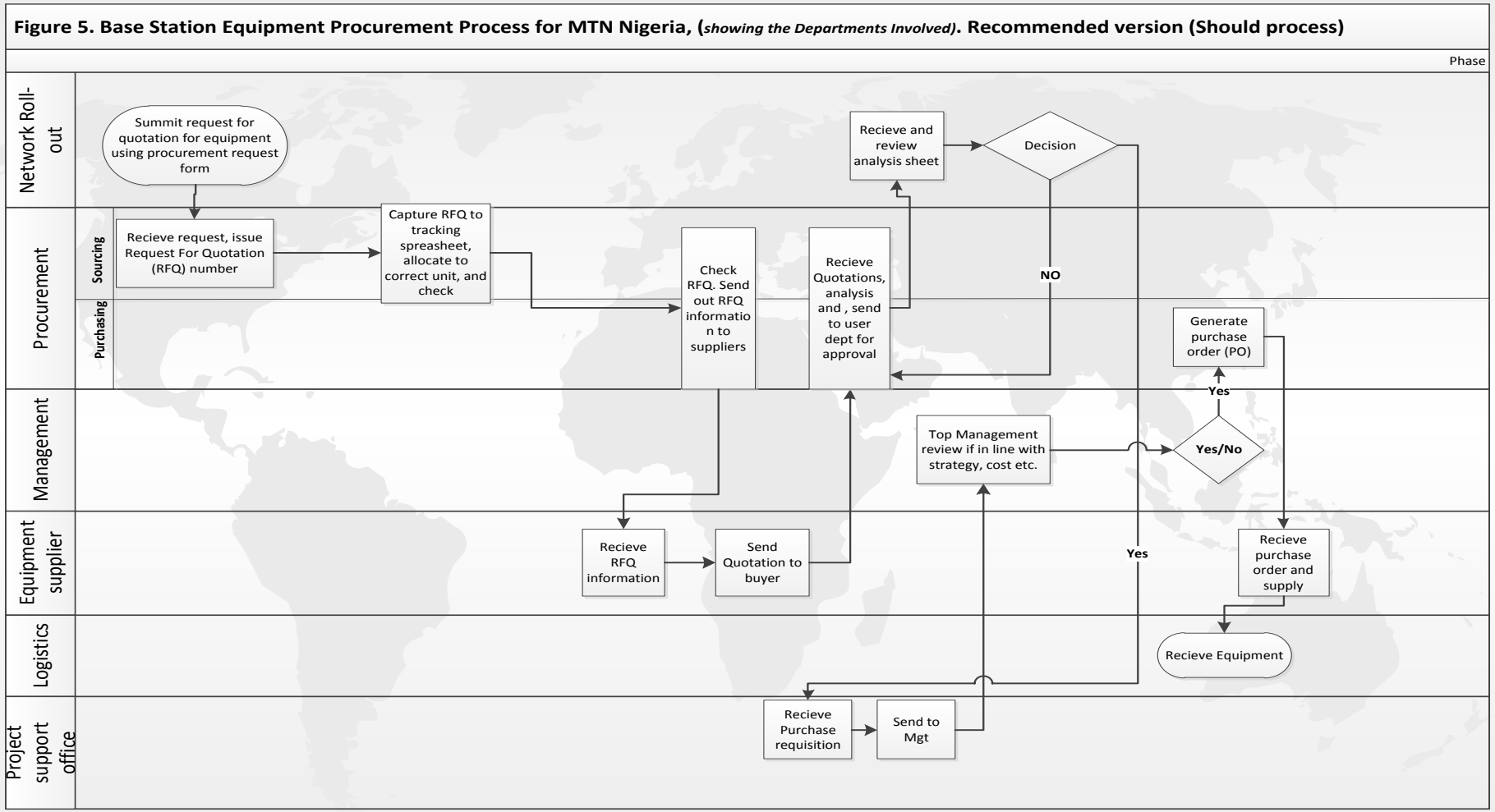
Nevetheless, MTN Nigeria Procurement process follows the the PMBOK recommendation, of plan, conduct, administer and close procurement. Most of the respondents contacted are holders of Project management professional qualification (PMP), making it easy for them to understand project management insideout. The process of procurement itself as shown in figure 1 is perhaps to long.

Most important of all is the successful identification of some of the most important critical success factors as stated above, which will serve as a guide to project managers in Nigeria undertaking telecommunication network equipment procurement project and provide a basis for further studies.

8. Recommendation

It is difficult to provide a recommendation on a subject like critical success factors for a project, especially telecoomunication network equipments. The key reason is that, every project is different, every organisation is different, and business operating environment is always different also. Geography, society, regulations and other factors come into play. What is important is for the project manager to assess the project critically, identify the relevant critical factors which will guide the execution of the project. The Nigerian telecommunication market is growing very fast, hence, the factors vital today may be irrelievant tommorrow. My recommendation will be to improve the procurement process by using process improvement methods advocated by Rummler and Blanch. The Process as identified in Figure 1 will lead to process inefficiency and create room for duplication and error. Figure 5 below is my recommendation for a process map for MTN Nigeria network equipment procurement process.

Figure 5. Base Station Equipment Procurement Process for MTN Nigeria, (*showing the Departments Involved)*. Recommended version (Should process)



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Appendix 1.

MTN QUESTIONNAIRE DATA COLLECTED															
CSFs	TS	SP/T	Pr	COP	CS/R	ST/T	WT	RK	TP	PP	PC	SC	SI	PM	CM
Respondents															
1	2	1	3		4	6			5	7			9	8	10
2	2	1	3		4				5						6
3	3	1	2		6	8			4			7			5
4	2	1	3		5	6			4						
5	4	1	2		7			5	3	6				8	
6	1	2	3		5				7	4					6
7	2	1	3		5					4			6		7
8	2	1	3		8	7			4		9	5		6	
9	2	1	3		6				4	5				7	
10	2	1	3		4				5						
11	2	1	3		4		9		5		6	10	7		8
12	2	1	3		4	6			5						
13	2	1	3		4				5	6				7	8
14	4	1	2		3				5	6					7
15	3	2	1		5	9			6				8		4
16	3	2	1		5	4			7			6		4	
17	2	1	3		4		8		6	5			7		9
18	2	1	3		4	7			5						6
19	2	1	3		5	6			4	8		7			
20	2	1	3		6	8			4	7			9	5	
21	2	1	3		6	9		10	5	4		9	7		8

Abbreviations.

TS Technological standards
SP/T Supply Process/Time
Pr Price
CoP Compliance of product
CS/R Contract with supplier/relationship
ST/D System Training/Documentation

WT Warranty
RK Risk
TM Top management
PP Past performanance
PC Product Capability
SC Security
SI System Integration
PM Performance measurement
CM Change management

MTN DATA Frequency Table

CSFs	TS	SP/T	PR	CP	CS/R	ST/D	WR	RK	TM	PP	PC	SC	SI	PM	CM
FREQUENCY															
1	1	18	2												
2	15	3	3												
3	3		16		1				1						
4	2				8	1			6	3				1	1
5					6			1	9	2		1		1	1
6					4	4			2	3	1	1	1	1	3
7					1	2			2	2		3	3	2	2
8					1	2	1			1			1	2	3
9						2	1				1	1	2		1
10								1				1			1
TOTAL	21		21	0	21	11	2	2	20	11	2	7	7		12

MTN Data		
RANKING	Frequency	Rank
SUPPLY PROCESS/TIME	18	1
Price	16	2
Technology standard	15	3
contract with supplier/relationship	8	5
Top management support	9	4
System training/doc	4	6
system Integratiom	3	9
Security	3	7
change managemet	3	8
performance measurement	2	10
risk	2	11

Appendix 2.

OTHER OPERATORS	76 Respondents	
Factors	Frequency	Ranking
SUPPLY PROCESS/TIME	63	2
Price	66	1
Technology standard	58	4
contract with supplier/relationship	61	3
Top management support	54	5
System training/doc	48	7
system Integratiom	42	8
Security	33	11
change managemet	49	6
Performance measurement	38	10
risk	20	12
Compliance of product	10	13
Warranty	40	9

Appendix 3.

Questions for Respondents.

a. Personal details.

12. Name.....
13. Job Title.....
14. Department.....
15. Years of project management experience.....

b. In your opinion, what is the process for Network Equipment procurement ?

c. In your opinion which departments are involved in Network Equipment procurement process ?

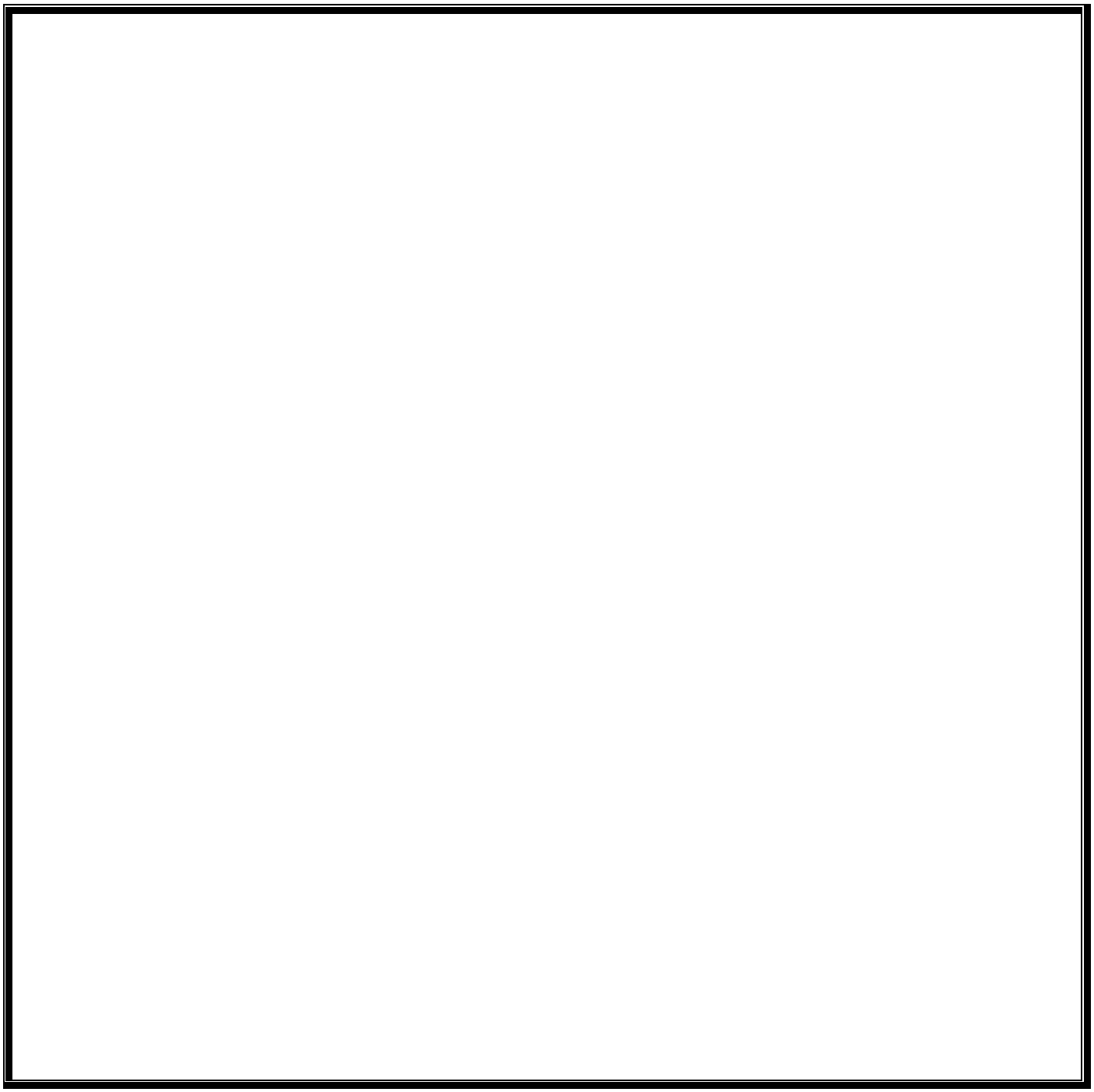
d. In your opinion what category of network equipment do you purchase?

e. Can you mention the budget spent approximately in the last three years on Network Equipment?

f. How do you conduct procurement of Network equipments e .g Bidders conference, proposal evaluation etc ?

g. What in your opinion are the critical factors you consider when conducting network equipment procurement. E.g. supplier process, technology etc ?

h. How would you rank these factors on a scale, taking 1 as extremely important?



Appendix 4. **Cronbach Alpha using SPSS**

```
RELIABILITY
  /VARIABLES=VAR00001 VAR00003 VAR00004 VAR00005 VAR00006 VAR00007 VAR00008
VAR00009 VAR00010 VAR00011 VAR00012 VAR00013 VAR00014 VAR00015
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA
  /STATISTICS=SCALE
  /SUMMARY=TOTAL.
```

Reliability

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	21	100,0
	Excluded[a]	0	,0
	Total	21	100,0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
,785	14

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
VAR00001	33,0000	160,800	,280	,741
VAR00003	42,8571	243,829	-,059	,789
VAR00004	41,3333	243,033	-,008	,789
VAR00005	39,0476	237,948	,105	,781
VAR00006	40,3810	211,348	,170	,767
VAR00007	43,1905	219,062	,233	,754
VAR00008	43,2857	213,514	,345	,733
VAR00009	39,3333	238,033	,070	,784
VAR00010	41,0476	220,748	,147	,772
VAR00011	43,2857	230,314	,110	,779
VAR00012	41,9048	195,790	,357	,712
VAR00013	41,4762	180,262	,495	,662
VAR00014	41,8571	241,329	-,084	,829
VAR00015	40,0000	217,400	,105	,787