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The Impact of Information and Communication Technology on the Technical Quality of Health Services "A Study at Al-Shatrah General Hospital - Dhi- Qar, Iraq"

By Dr. Qassim N. AL-Mahwey & Hydar R. Sayah

Iraqi University

Abstract- The aim of this study was to reveal the impact of information and communications technology in improving the technical quality of health services provided at Al-Shatrah General Hospital. The study sample was the type of intention sample. As the questionnaire was adopted as a tool to measure the variables of the study, it was distributed electronically to 108 doctors working in the hospital and the number of respondents was 93 doctors. Data were collected by the Excel program, while statistical analyzes were performed using the SPSS version 23 program. This study is the first of its kind in the Iraqi health sector. The results revealed that information and communication technology affect the technical quality of health services. Whereas, Al-Shatrah General Hospital possesses competent and skilled doctors, but they do not have time for medical diagnosis, which affects the quality of the health services provided. This study made some recommendations, the most important of which is building an internal and external communication system and adopting health information security programs.

Keywords: *ICT; technical quality; health services; reliability; the safety.*

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The Impact of Information and Communication Technology on the Technical Quality of Health Services "A Study at Al-Shatrah General Hospital – Dhi- Qar, Iraq"

Dr. Qassim N. AL-Mahwey ^α & Hydar R. Sayah ^σ

Abstract- The aim of this study was to reveal the impact of information and communications technology in improving the technical quality of health services provided at Al-Shatrah General Hospital. The study sample was the type of intention sample. As the questionnaire was adopted as a tool to measure the variables of the study, it was distributed electronically to 108 doctors working in the hospital and the number of respondents was 93 doctors. Data were collected by the Excel program, while statistical analyzes were performed using the SPSS version 23 program. This study is the first of its kind in the Iraqi health sector. The results revealed that information and communication technology affect the technical quality of health services. Whereas, Al-Shatrah General Hospital possesses competent and skilled doctors, but they do not have time for medical diagnosis, which affects the quality of the health services provided. This study made some recommendations, the most important of which is building an internal and external communication system and adopting health information security programs.

Keywords: ICT; technical quality; health services; reliability; the safety.

I. INTRODUCTION

The high- quality health service contributes to improving the health organization's reputation, and this helps it to survive and grow in a competitive environment. Al-Shatrah General Hospital is one of the governmental health organizations that provide health services for patients. Patients often review private sector hospitals instead of reviewing government sector hospitals. They perceive that private sector hospitals have health hardware, equipment, software, and human resources that help in accurate medical diagnosis. Therefore, the study of the impact of information and communication technology in improving the technical quality of health services with a view to diagnosing weaknesses and defects and providing solutions to increase patients' confidence in the health services provided in Al-Shatrah General Hospital.

Edlund et al (2003) conducted a study to analyze the relationship between satisfaction and technical quality of care for common mental disorders.

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The results of the study indicated an association between effect and quality between technical quality and patient satisfaction. The Al-Hassan et al. (2015) study was a statistical test to determine differences in health service perceptions from the service provider and the patient, as the study results showed that teaching patients to comply will help improve the technical quality of health services. Barr et al. (2017) study revealed that the success of information and communication technology depends on supporting social relations and technological organization. The goal of improving information and communication technology will improve the technical quality of health services. Omona and Odongo (2006) have studied the evaluation of the application of information and communications technology in accessing health information in Uganda, where it was interested in analyzing the current situation of information and communication technology applications and the cost of accessing medical information and literacy of information and communications technology. Healthy.

This study is the first of its kind in the Iraqi health sector as the effect of information and communication technology in improving the technical quality of health services have not been studied previously. Technical quality is one of the topics that has not been highlighted by researchers in the Iraqi environment, as it was studied for the first time in the field of Iraqi higher education by (Khaleel and Sayah, 2020), and this study is the second of its kind in terms of its study of the technical quality variable in general and the first in terms of its specialization In the Iraqi health sector.

II. LITERATURE REVIEW

a) Information and Communication Technology

Technology is a term consisting of two parts: the first Techno meaning practical application; The second is Logy, which means science, and therefore technology means "applied science" (Hasson, 2017). The interaction of technology with information was why the emergence of the term information and communication technology (acronym). It is intended to

use modern techniques of computer science and technical analysis in organizing the amount of data and information related to all aspects of life (Alshahrabally and Dawood, 2017).

Apulu and Latham (2011) indicated that information technology and communication is a tool that facilitates communication, processing, information transfer, and knowledge sharing through electronic means. Binuyo and Aregbeshola (2014) referred to it as a wide range of computerized technologies that allow communication, electronic information capture, processing, and transmission. They identified it (Hasan et al., 2016) as a study; Design; Development; Implementation of; Support and management of computer-based information systems, especially software and computer applications. Gargvanshi and Kumar (2020) defined it as a general term that includes the various technologies that deal with information, processing, and presenting it to the people concerned. Information and communications technology can be defined as the systems and tools supporting communication and cooperation between people and organizations efficiently and effectively.

b) *The importance of information and communications technology*

Information and communication technology is important in business strategies because it has a role in improving the competitive situation. It contributes at the industry level to changing its nature in which organizations compete through the integration of industry with computers and various other formations of flexible production. The emergence of information technology has created new opportunities for the top management of organizations. On the level of production economics, the organization's possession of information and communication technology contributes to reducing costs, reducing effort, and optimal use of available resources and highlights the importance of information and communication technology at the level of distribution and marketing activities. The organization's possession of information technology and a modern and advanced communications network enables it to control weaknesses in the market; helps her make the appropriate decisions in marketing (Hammadi et al., 2018; Saleem et al., 2020). Omona and Odongo (2006) pointed out that the importance of information and communication technology in health services lies in the following:

Provide high-quality, up-to-date information and data;

- Avoid geographical boundaries, as people from all over the world have access to information;
- To keep abreast of developments in the field of health globally;
- Enables faster access to relevant information sources;

Be able to improve knowledge of health services. It is an incentive to learn and research.

c) *Types of Information and Communication Technology*

Information and communication technologies in health services are classified into three types based on their role and use in the health field (Barr et al., 2017):

- *Information and Communication Technology for Health Information:* It is concerned with electronic health records that include data and information about medicines, laboratory results, etc. It has a prominent role for coordination between doctors who have common roles and responsibilities and is the basis in making medical decisions. It also contributes to building doctors' capabilities in managing patients and performing work efficiently and effectively without the need for field and direct communication between doctors, which reduces the burden on doctors with multiple tasks (Naik and Singh, 2010)
- *Information and Communication Technology for Telehealth services:* It specializes in providing tele health services using telecommunications techniques. Medical and health advice is provided to patients through information and communication technologies such as telephones and others. It also contributes to the process of communication between medical personnel on various categories of doctors and nurses. It also assists people suffering from chronic diseases through continuous communication with physicians treating them to follow up their health (Vermeulen et al., 2014)
- *Information and Communication Technology The source of learning:* This technology provides them with forums and electronic gatherings to exchange knowledge between doctors and may include patients in some cases. At the same time, this technology provides an opportunity to communicate health institutions and health professional unions (Barr et al., 2017).

d) *Factors affecting Information and Communication Technology*

Information and communications technology in health services is affected by the occupational or career conflict of roles, responsibilities, and cultures. As the absence of explicit rules governing behavior in how and when the communication process is conducted, information and communication technology can exacerbate the differences between cultures. The skills that the medical staff possess are one of the factors affecting information and communication technology, in which health institutions must adopt a continuing education curriculum; and create an appropriate job climate compatible with information and communication technology applications (Barr et al., 2017). Yassir and

Dakhil (2016) They mentioned a group of factors that affect information and communication technology, as follows:

- **Administrative decision:** The administrative decision affects the role of information and communications technology and to facilitate the user's needs (customer, organization) of data.
- **Computing:** Computing is the factory of information technology and its developer.

Political, economic, and security factors: These factors may affect study or training plans (related to information technology) that are set by countries. For example, fees or cancellations of many training programs are imposed due to economic conditions, which makes information technology weak and does not rise to the level of performance.

e) *Dimensions of Information and Communication Technology*

Most researchers agreed that (hardware, equipment, software, communication networks, human resources) represent the components of information and communications technology that depend on them for data collection, processing, and conversion into information that is published, distributed, stored, updated, and retrieved (Hammadi et al., 2018). Accordingly, the current study will address the components of information and communications technology as a measurement model that includes dimensions according to the following:

- **Hardware and Equipment:** This dimension focuses on the hardware and equipment needed to run the software. The computer may be the most obvious part of this dimension, and this dimension includes medical devices, imaging devices, data projectors, and data entry devices such as mouse and keyboard (Sittig and Singh, 2015).
- **Software:** Represents drivers guide the hardware components of hardware and equipment (Hammadi et al., 2018). This dimension includes system drivers and application software and is responsible for processing, storing, retrieving, and transmitting health data as needed (Sittig and Singh, 2015).
- **Communication Networks:** Communication technology is important and has a valuable content in information and communication technology and represents a group of computers and surrounding devices connected to allow users to exchange information (Abdul Hadi and Hadi, 2018).
- **Human Resources:** The most important aspect of information and communication technology because they that it is the decision-maker in determining the usefulness of information for adoption in the decision-making process, and they are the people who operate and manage

information and communication technology (Hammadi et al., 2018).

f) *Technical Quality of Health Services*

The American Joint Commission on Accreditation of Hospitals (JCAH) defines the quality of the health service as the level of adherence to standards approved for good practice and the expected results of the health service or diagnosis or medical problem (Al Jazari et al., 2011). Quality should be available in the health services provided to patients according to pre-defined specifications and standards and presented at the required times in a manner that achieves patient satisfaction (Musleh, 2017).

Technical quality seeks to achieve customer satisfaction and gain and maintain their loyalty. The technical quality of health services depends on good diagnostic methods, information systems, and infrastructure and the skills of service providers (Mittal and Lassar, 1998). The technical quality of health services is defined as the knowledge and technology side. It represents the knowledge, skills, and experiences and the degree of scientific and technological progress available for medical care, techniques, and methods used in medical care (Al Jazari et al., 2011). While (Ghebremichael, 2019) defined it as customer perception of quality about the final (actual) result of the service. Al Hassan et al. (2015) defined technical quality in health services as the extent to which health services meet the standards Predetermined. Accordingly, the technical quality of health services can be defined as the final and actual result that patients receive. Al hassan et al., (2015) referred that the quality of health services is divided into two types, namely technical quality, and perceived quality. While (Edlund et al., 2003) referred that the quality of health services is classified into:

- **Technical Quality:** Relates to the extent to which the health service conforms to the standards previously determined by the service provider.
- **Personal Quality:** which represents the quality of medical personnel
- **Patient comfort:** It relates to the amenities that affect patients regarding the level of service.

It can be said personal quality represents the functional quality of health services as it relates to how to provide services to patients and the relationships that arise between service providers and patients receiving the health service. As for the patient's comfort, it represents the mental image of the patient's quality level, which corresponds to the perceived quality.

Technical quality in health services includes medical knowledge; Physical examination; Arrange tests when needed; Making the correct diagnosis; He described the appropriate treatment. Patients, especially the elderly, may not distinguish between the technical

quality of health services and other aspects related to the technical quality of a doctor's performance. The technical quality of health services is closely related to communication skills; Interpersonal skills; Trustworthiness (Rao et al., 2006). While (AlHassan et al., 2015) indicated that the results of the technical quality assessment without taking into account the experiences and opinions of patients might not enhance the quality from the customer/patient perspective, which is required. The Safe Care Initiative, in collaboration with the Pharm Access Foundation, the Southern Africa Health Services Accreditation Council (Southern Africa - COHSASA), and the Joint Commission International (JCI), has proposed evaluation criteria categorized as: (Leadership and Accountability; Competent Workforce Capacity; Safe Environment for Employees and Patient Auditors; Clinical Care For patients; improving quality and safety).

g) *The Importance of Technical Quality of Health Services*

Technical quality represents the degree to which the service can meet the requirements correctly. "It is measured according to technical standards; it represents the equivalent of service to quality specifications. The absence of complications when treating patients is an example of the technical quality of health services. The importance of technical quality of services is highlighted. Health focuses on medical and health tools and means and medical diagnosis (Fiala et al., 2012). Chakraborty and Frick (2002) were referring that the technical quality of health services determines the level of application of WHO standards. In addition to that, the technical quality works to diagnose the nature and quality of the problems related to the technical aspects of health services. It can be said that the technical quality highlights its importance in improving the mental image of patients about health services.

h) *Factors Affecting the Technical Quality of Health Services*

Quality of health service is affected by factors including analyzing patient expectations; Design quality of service; The performance of health and administrative staff; And other factors represented in the financial capabilities of the health institution (Al-Asadi, 2019). Similarly, the technical quality of health services is also affected by several factors that can be summarized according to the following (Chakraborty and Frick., 2002):

- **Performance:** The technical quality of health services is affected by the performance of medical personnel, which requires them to possess the knowledge and skill necessary to provide the minimum performance by accepted health standards that lead to customer satisfaction. For these health organizations work to develop the

performance of their cadres through specialized training programs.

- **Medical devices and equipment:** The lack of available devices, equipment, and tools for medical diagnosis affects the technical quality of the health service.
 - **Excessive prescribing of the drug without regard to the social and economic condition of patients.**
- i) *The Dimensions of The Technical Quality of Health Services*

The technical quality in the health service is the extent to which the health services conform to the pre-established standards. To measure the technical quality in health services, the dimensions indicated by (Keramidou and Triantafyllopoulos, 2018) have been adopted with the addition of a safety dimension because of its importance in measuring the technical quality of health services in our current field of study. Below are dimensions the technical quality of health services:

- **Reliability:** represents the health institution's ability to provide a service that matches the pre-determined criteria. It is the degree of dependence on providing the required service with the accuracy and the right time (Al Jazari et al., 2011).
- **The efficiency of performance:** means having the skills and knowledge required to perform the service. The efficiency of performance includes both the knowledge and skills of service providers at their various levels and specialties and the research capacity of the organization (Parasuraman et al., 1985). It is the skills, technical capabilities and consistent, correct, and actual performance of the health institution providing the services (Al-Zubaidi and Al-Shujairy, 2018).
- **Safety:** means that health services are free from errors, risks, and skepticism (Al Jazari et al., 2011).

III. HYPOTHESES

For the purpose of upgrading the health service provided, health organizations strive to improve their services for the survival and growth that are linked to patient satisfaction, and since patient satisfaction is affected by the technical quality of health services obtained from health organizations. The importance of this study was highlighted by knowing the effect of information and communication technology on the technical quality of the health service provided at Al-Shatrah General Hospital. What kind of relationships do they have. The hypotheses stated as follows:

H1: There is a significant correlation between the ICT variable and the technical quality variable.

H2: There is a significant correlation between the Hardware and Equipment dimension and technical quality.

H3: There is a significant correlation between Software and Technical Quality.
H4: There is a significant correlation between communication networks and technical quality.
H5: There is a significant correlation between human resources and technical quality.
H6: There is a significant effect of the ICT variable on the technical quality variable.

H7: There is a significant effect of Hardware and Equipment dimension on the technical quality variable.
H8: There is a significant effect of Software dimension on technical quality.
H9: There is a significant effect of the dimension of Communication Networks on technical quality.
H10: There is a significant effect of the Human Resources dimension on technical quality. Below is a hypothesized model for the study

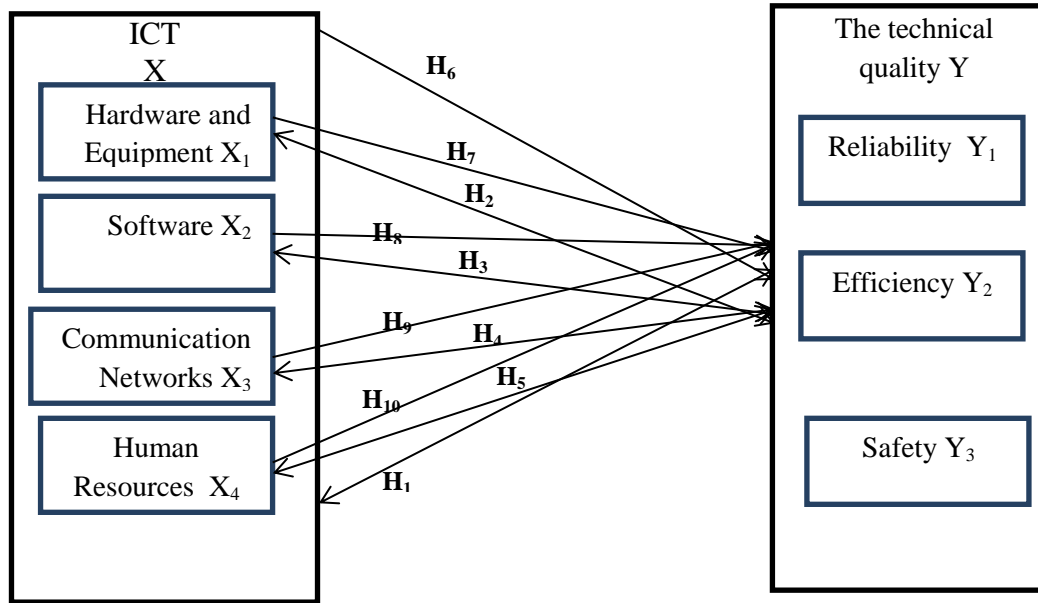


Figure 1: A hypothesized model for the study

IV. SAMPLE AND DATA COLLECTION

The sampling method used in the present study is an intentional sampling. To represent this community for study realistically, all the doctors working in Al-Shatrah General Hospital were chosen. The questionnaire was distributed electronically to 108 doctors from different specialties, and 93 usable answers, or 86.1%, were received.

Respondents included 67 (72.05%) male from doctor and 26 (27.95%) female doctor. Most of the educational qualifications of the respondents were MA 40 and Ph.D. 35 with a percentage of (43% and 37.6%), respectively while the number of respondents with a bachelor's degree was 18 doctors with a percentage (19.4%). The majority of respondents had work experience from 20 - less than 25 years (39.6 %) followed by 15 - less than 20 years (25.2%) and 10 - less than 15 years (15.3%) and less than 5 years (10.8%) and five - less than ten years (8.1%) 25 years and over (0.9%).

V. MEASUREMENT OF SEARCH VARIABLES

To measure the variable of information and communication technology, the questionnaire used by (Abdul Hadi and Hadi, 2018) was approved after making

adjustments and developments in proportion to the field of study. The ICT questionnaire has four dimensions: hardware and equipment; and software; Communication networks; and human resources. The questionnaire was organized from 15 indicators to measure the four dimensions of information and communication technology. The technical quality of health services was measured using a questionnaire. Because the questionnaire consisted of 3 dimensions, the reliability and efficiency measurements were relied on from the study (Keramidou and Triantafyllopoulos2018). Still after safety, it was designed to fit the field of study. The indicators for measuring the technical quality of health services, according to the questionnaire reached 14 indicators.

The questionnaire was designed according to the Likert pentatonic scale 1 "I strongly disagree" and 5 "Strongly agree." Then the validity of the questionnaire was tested by distributing it to a pilot sample of 30 doctors. The Cronbach's Alpha value was obtained, which was 0.94, which is greater than 0.6, and thus, the designed resolution is suitable for exploring the research. A data distribution test was also conducted to determine the type of data distribution, whether it was normal or abnormal. The Kolmogorov-Smirnov was

obtained from the results of Table 1, the value of a Kolmogorov-Smirnov for the information and communication technology variable was 0.069 and for the technical quality variable for health services 0.080.

Since the value of sig values in Table 1 is greater than the significance level of 0.05, this indicates that the distribution is normal and that it is possible to perform statistical tests.

Table 1: Tests of Normality

Tests of Normality Kolmogorov-Smirnov ^a			
variable	Kolmogorov-Smirnov ^a		
	Statistic	df	Sig.
The information and communication technology	.069	111	0.200*
The technical quality	.080	111	0.081

VI. DESCRIPTIVE STATISTICS AND CORRELATIONS

The collected data were processed using the SPSS V.23. In Table 2, the results refer that the mean for

the ICT variable was 3, 2426, with a standard deviation of 0.77625. The dimension of human resources got the highest relative importance, as it reached 66.546%, while the dimension of communication networks got the least relative importance, which reached 61.712%.

Table 2: Descriptive statistics of the variable of information and communication technology

The independent variable and its dimensions	Mean	Std. Deviation	%
Hardware and Equipment X ₁	3.2680	1.05460	65.36%
Software X ₂	3.3108	0.75845	66.216%
Communication Networks X ₃	3.0856	0.80869	61.712%
Human Resources X ₄	3.3273	0.97647	66.546%
Information and Communication Technology X	3.2426	0.77625	

In Table 3, the results refer that the mean value of the technical quality variable for health services was 3.4180, with a standard deviation of 0.75296. While the dimension of efficiency obtained the highest relative

importance, which amounted to 71.352%. While dimension reliability got the least relative importance, which was 68.36%.

Table 3: Descriptive statistics of the variable of the technical quality

Dependent variable and its dimensions	Mean	Std. Deviation	%
Reliability Y ₁	3.4180	0.75296	68.36%
Efficiency Y ₂	3.5676	0.69536	71.352%
Safety Y ₃	3.5045	0.71048	70.09%
The technical quality Y	3.4180	0.75296	

In Table 4, the results indicate the correlation relationships between the ICT dimension and its variable

and the technical quality dimension and its dimensions. As the positive correlations.

Table 4: Spearman Correlation Coefficient between Information and Communication Technology and technical quality

Independent variable and its dimensions	Dependent variable and its dimensions			
	technical quality	Reliability	Efficiency	Safety
Correlation Coefficient (Information and Communication Technology)	.798**			
Sig	0.000			

Correlation Coefficient (Hardware and Equipment)	0.618**	0.640**	0.535**	0.339**
Sig	0.000	0.000	0.000	0.000
Correlation Coefficient (Software)	0.740**	0.713**	0.675**	0.381**
Sig	0.000	0.000	0.000	0.000
Correlation Coefficient (Communication Networks)	0.681**	0.620**	0.645**	0.358**
Sig	0.000	0.000	0.000	0.000
Correlation Coefficient (Human Resources)	0.748**	0.759**	0.666**	0.386**
Sig	0.000	0.000	0.000	0.000
**Correlation is significant at the 0.01 level (2-tailed).				
*Correlation is significant at the 0.05 level (2-tailed).				

Regression analysis was performed to determine the impact of information and communication technology on the technical quality of health services. As the results of Table 5 indicate an effect of the ICT variable and its dimensions on the technical quality variable. As the Hardware and Equipment affects the technical quality, as it has a value of ($\beta = 0.386$). At the same time, the Software dimension affected technical

quality of ($\beta = 0.637$). As for the Communication Networks dimension, its effect on technical quality is ($\beta = 0.543$). As for the Human Resources dimension, it had an effect on the technical quality by ($\beta = 0.463$), and according to what was mentioned, the variable of information and communication technology affects the technical quality variable by ($\beta = 0.656$). The regression line equation can be mentioned as follows:

$$Y = (2.238 + 0.386 X1) + (1.391 + 0.637 X2) + (1.824 + 0.543 X3) + (1.960 + 0.463 X4) + (1.373 + 0.656 X)$$

Table5: Regression analysis between the ICT variable and the technical quality variable

Dependent variable and its dimensions	Sig	R ²	T	F	β	a	Independent variable and its dimensions
Technical quality	0.000	0.688	9.726	240.07	0.656	1.373	Information and Communication Technology
	0.000	0.440	15.621	85.677	0.386	2.238	Hardware and Equipment
	0.000	0.619	8.577	177.14	0.637	1.391	Software
	0.000	0.512	11.254	114.23	0.543	1.824	Communication Networks
	0.000	0.542	13.868	129.03	0.463	1.960	Human Resources

VII. RESULT AND DISCUSSION

The aim of the research is to investigate the impact of information and communication technology on the technical quality of health services. Where descriptive statistics reveal, as shown in Table 2, that the mean to Hardware and Equipment has reached (3.2680), which indicates that the health institution suffers from weaknesses in the maintenance programs for devices and equipment for information and communication technology. While the mean to a dimension of Software (3.3108) indicates that the health organization is not interested in developing the software used in the performance of its health work continuously. As for the value of the mean to the Communication Networks dimension, it reached (3.0856), and this indicates that the health organization is using the internal and external communications network poorly, in

addition to weakness in health information security techniques. As for the Human Resources dimension, the mean reached (3.3273), which indicates the lack of interest of the health organization in allocating a financial budget for human resources training.

Descriptive statistics related to technical quality, as shown in Table 3, reveal that the mean to a dimension of Reliability has reached (3.4180), which indicates that the health institution abides somewhat poorly by its promises to patients in providing health services and providing the appropriate environment as expected by patients. The mean to a dimension of Efficiency (3.5676) indicates that the health organization has doctors with competence, and skill in medical diagnosis and they show interest to patients during treatment. Still they do not have enough time to make a diagnosis. The average value of the Safety dimension is (3.5045), which indicates a weakness in the system for

guaranteeing the rights of patients in the event of a medical error. The health organization does not rely entirely on international standards for safety in health services, and this is what made the patients' lack of confidence in the health services provided in Al-Shatra General Hospital.

Table 4 reveals the correlation relationships between the independent variable ICT and the dependent technical quality variable. Whereas, the correlation relationships for the variable of information and communication technology and all its dimensions with the variable of technical quality and all its dimensions were positive relations and statistically significant because the sig values were less than the value of the significance level at (0.05). Thus we accept the correlation Hypotheses.

Table 5 reveals the results of the relationship of ICT impact and all its dimensions on the technical quality. Where the results reveal that Information and Communication Technology; Hardware and Equipment; Software; Communication Networks Human Resources have a statistically significant effect on technical quality since the sig values were below the significance level at (0.05). Thus we accept hypotheses of impact. This indicates that attention to information technology and communications, improvement and development will positively affect the level of technical quality of health services. Therefore attention must be paid to information and communications technology to improve the quality of health services.

VIII. CONCLUSIONS

The results showed a positive relationship between information and communication technology and technical quality. Information and communication technology also affects the technical quality, which means that Al-Shatrah General Hospital must pay attention to information and communications technology and work to improve and develop it. This leads to improving the technical quality of the health service.

The results indicated that Al-Shatrah General Hospital includes qualified and skilled doctors who care for patients during the treatment period. Still, they suffer from the limited time required for the medical diagnosis process. This means that the Al-Shatrah General Hospital suffers from a shortage of doctors. The administration of Al-Shatrah General Hospital must develop a plan to attract doctors to hide the workload from existing doctors.

The results also showed that the internal and external communications system in Al-Shatrah General Hospital is poor. Also, there is no strong information security system, which the hospital administration must take care of with such systems because this helps them to improve the performance of their health work.

IX. LIMITATIONS AND FUTURE RESEARCH

This study was conducted only in Al-Shatrah General Hospital - Dhi Qar - Iraq. The study relied on taking the intentional sample. The future researcher can expand the scope of the study by taking several government hospitals or conducting a comparative study between government and private sector hospitals.

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Moderating Role of Community Participation on Performance of Affordable Housing Program in Kenya

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Abstract- It is estimated that the current affordable housing deficit stands at 2 million houses with nearly 61% of urban households living in slums. This deficit continues to rise due to fundamental constraints on both the demand and supply side and is exacerbated by an urbanization rate of 4.2%, equivalent to 0.5 million new city dwellers every year. The study intended to examine how project management triple constraints and performance of affordable housing program in Kenya. Specifically, the study aimed to examine how project scope management and project time and moderating influence of community participation on affordable housing program in Kenya. The study was based on the theory of triple constraints and complexity theory. The study intended to adopt descriptive research design. The target population of this study was 24,000 social housing projects. The study used simple random sampling to select 393 social housing projects units from the target population.

Keywords: *scope management, time management, community participation.*

GJMBR-G Classification: *JEL Code: O22*



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Moderating Role of Community Participation on Performance of Affordable Housing Program in Kenya

Maeri Onderi David ^α, Prof. Iravo Mike Amuhaya ^σ & Dr. Muchelule Yusuf Wanjala ^ρ

Abstract- It is estimated that the current affordable housing deficit stands at 2 million houses with nearly 61% of urban households living in slums. This deficit continues to rise due to fundamental constraints on both the demand and supply side and is exacerbated by an urbanization rate of 4.2%, equivalent to 0.5 million new city dwellers every year. The study intended to examine how project management triple constraints and performance of affordable housing program in Kenya. Specifically, the study aimed to examine how project scope management and project time and moderating influence of community participation on affordable housing program in Kenya. The study was based on the theory of triple constraints and complexity theory. The study intended to adopt descriptive research design. The target population of this study was 24,000 social housing projects. The study used simple random sampling to select 393 social housing projects units from the target population. This study used both primary and secondary data. Secondary data was obtained from annual reports under affordable housing program. The study used semi-structured questionnaires to collect data. SPSS version 24 was used to analyze all quantitative data. Inferential and descriptive statistics were used to analyze qualitative data. The study found that: project scope management significantly influences performance of affordable housing program in Kenya; project time management significantly influences performance of affordable housing program in Kenya. The study further established that community participation has moderating influence on the relationship between project management triple constraints and performance of affordable housing program in Kenya.

Keywords: *scope management, time management, community participation.*

I. INTRODUCTION

Projects are time bound endeavors that are supposed to be completed within the planned and stipulated time period covering a predetermined scope, within planned budget and quality specified by the customer or client Cheng, (2014). Project success is controlled by time, cost and scope, commonly referred to as Project Triple Constraint (Baymount, 2015; Akinyde, 2014; Wanjau, 2015). For every successful project, considerations are based on the triple constraint before, during and after project implementation. The project constraints sometimes

referred as the iron triangle are common in the construction projects (Catania, Armstrong & Tucker, 2015; Nasir, Nawi & Radzuan, 2016). The failure to understand and interpret iron triangle appropriately may affect a construction project though project activities are carried out effectively (Omondi, 2017; Chin & Hamadi, 2015; Kiarie & Wanyoike, 2016; Kariungi, 2014; Leong et al. 2014).

Construction projects include the design and build of new structure (Sheshu and Akitonye, 2015) In many countries in the world construction activity constitute 6-9% of gross domestic product (GDP) and more than half of the fixed capital formation as infrastructure and public utilities required for economic development (Cohen, 2013). The program performance is based on a set-criteria anchored on the standards or principles from which stakeholders are able to judge the project success (Nibiyza, 2015; Rugenyi & Bwisa, 2016). These are the key predictors which are very crucial for every successful project in terms of achievement of the goals and objectives.

This study is grounded on the triple constraint theory trying to explain the influence of time, cost and scope which bounds the universe of every performing project (Osedo, 2015; Hassan & Adeleke, 2019; Banda & Pretorius, 2016; Nibiyza, 2015). The key standards and principles which must be accomplished in every project as stated by (Van Wayngaad, Pretorius, & Pretorius, 2012) are the definitely the project triple constraint in a construction project which must be balanced appropriately (Catania, Armstrong & Tucker, 2015; Nasir, Nawi & Radzuan, 2016). The cause and effect of new or changing triple constraint requirements are constantly negotiated during all phases of a project (Lukale, 2018; Rugenyi & Bwisa, 2016; Omondi, 2017). The three key triple constraint relationships signify that at least one of the triple constraint variables must be constrained (otherwise there is no baseline for planning), and at least one of the variables must have capacity for exploitation (otherwise quality may be affected) (Abulkhaim & Adeleke, 2019; Beleu, Crisan & Nistor, 2015; Omondi, 2017; Rugenyi, 2017).

Based on this argument, according to Osedo (2015) stated the county government funded projects in Kenya have indicated puzzling statistics which have

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shown underperforming statistics whereby the existing records have reported that between 60% to 82% of projects have failed. These projects are struggling in terms of being accomplished within the budget, time without compromising quality (Omondi, 2017). Similarly, Omolo (2016) found out that county governments funded construction projects have issues in regard to project scope management. This means that they rarely follow the necessary processes for the implementation of the projects, activities and tasks associated and for the successful finalization of the project (Sikudi & Otieno, 2017; Mwangi, 2018).

II. STATEMENT OF THE PROBLEM

The 2010 Constitution of Kenya identifies access to adequate affordable housing and to reasonable standards of sanitation as an economic and social right (Manji, 2015). It is estimated that the current housing deficit stands at 2 million houses with nearly 61% of urban households living in slums. This deficit continues to rise due to fundamental constraints on both the demand and supply side and is exacerbated by an urbanization rate of 4.2%, equivalent to 0.5 million new city dwellers every year. With this level of growth, Kenya requires approximately 200,000 new housing units annually to meet demand, yet only 50,000 homes are built, leaving the housing deficit growing by 150,000 units per year. As a result of this mismatched supply and demand, housing prices have increased by 100% since 2004 (KNBS, 2017).

Actual expenditure on housing by the national housing corporation went down to Ksh 5.9 billion in 2014/2015 from Ksh 6.1 billion in 2013/2014 due to fewer projects been completed (KNBS, 2016). According to Korir, (2013) poor performance of construction housing projects has led to project delays of up to 184.7% and cost overruns of up to 152.3%. Gacheru, (2015) established that poor program performance in the housing sector can be attributed to; unqualified technicians, incompetent contractors, non-compliance to specifications, poor project designs, lack of quality control measures, poor cost estimation and use of substandard materials. The construction projects fail in the project triple constraint considerations which are very crucial in projects' decision making in the country. The failure to understand, interpret and apply this criterion is regarded as one of the factors which has led to underperformance of the projects being funded by the governments (Omondi, 2017; Kiarie & Wanyoike, 2016; Gitee, 2018; Muchelule, 2018). Lukale (2018) found out that project triple constraints management significantly improves performance of projects by more than 70%.

Local studies related to project triple constraints management and performance of projects have been carried out in different sectors. For instance, Omondi

(2017) study focused on the triple constraint management and WASH projects completion in Nakuru County, Kenya. Rugenyi and Bwisa (2016) study was on project triple constraint and project manager's perspective on management of projects in Nairobi. Further, Kiarie and Wanyoike (2016) study focused on the government funded projects and specifically integrated financial management information system (IFMIS) project was used as a case study. From the aforementioned studies no study has focused on the relationship between project triple constraints management and performance. A gap this study sought to fill. It is on this premise this study, therefore, examined project triple constraints management (cost, time, quality and scope) on performance of affordable housing program in Kenya.

III. OBJECTIVES OF THE STUDY

The purpose of this study was to examine project management triple constraints and performance of affordable housing program in Kenya.

a) *Specific Objectives of the Study*

The study was guided by the following specific objectives;

- i. To examine the influence of project scope management on performance of affordable housing program in Kenya.
- ii. To establish the influence of project time management on performance of affordable housing program in Kenya.
- iii. To explore the moderating influence of community participation on the relationship between project management triple constraints and performance of affordable housing program in Kenya.

b) *Research Hypotheses*

The statistical null hypotheses to guide the above stated objectives included:

H_{01} : Project scope management does not significantly influence performance of affordable housing program in Kenya.

H_{02} : Project time management does not significantly influence performance of affordable housing program in Kenya.

H_{03} : Community participation has no moderating influence on the relationship between project management triple constraints and performance of affordable housing program in Kenya.

IV. LITERATURE REVIEW

a) *Theoretical Review*

i. *Theory of Triple Constraints*

The theory of triple constraints is derived from the very definition of a project which states that a project is a temporary group activity which is designed to

produce a desired result or service or a unique product (PMI, 2015). The theory of the triple constraint depicts that the project triple constraint management is an iron triangle of cost, scope, quality and time which bounds the project universe which must be achieved (Dobson, 2004). Construction projects brings complications in project management, needs and constraints and therefore for effective project management, constraints have to be managed. Projects take place inside organizations where, there is a finite amount of resources with which to accomplish infinite tasks. This results in scarcity and the triple constraints; a deadline, a budget, and a minimum acceptable level of performance (Dobson, 2004).

The theory of the triple constraints is anchored on the project management with an understanding that a project should be a balance of the three interdependent project constraints (time, scope and cost) to achieve the desirable results. The cause and effect of new or changing triple constraint requirements are constantly negotiated during all project processes, and the three key triple constraint relationships signify that at least one of the triple constraint variables must be constrained (Wayngaad, Pretorius & Pretorius, 2012).

Implying that most of adopted project management strategies to enhance program performance like planning process, scheduling process, a methodology for introducing work that actually leads to increased capacity, execution processes that provide excellent project control, visibility and decision support and work behaviors that are more conducive to good program performance (Jacob & McClelland, Jr, 2001). The theory enhance the understanding of the project manager contribution deliverables per the clients satisfactions. Further, the theory requires continuous improvement to sustain quality in the project dimensions (Nyakundi, 2015).

While, triple constraints criteria in project management have been accepted as a measure of project success. Due to uncertainty and involvement of three different and opposing factors time, cost, and quality, most projects are difficult to manage (Jacob & Mc Clelland, Jr, 2001). Every one of the three limitations have their individual impacts on project execution yet since these components have some relationship, one imperative bear an impact on the other two, in the long run influencing ventures expectations (Hamid, *et al.*, (2012). This theory from organizational perspectives may work well or fail hence leading to delays if it isn't well embraced. For the county government funded construction projects, the time and cost overruns delays are a common problem not only with an immeasurable cost to government and public but also with debilitating effects on the contracting parties (Ondari & Gekara, 2013).

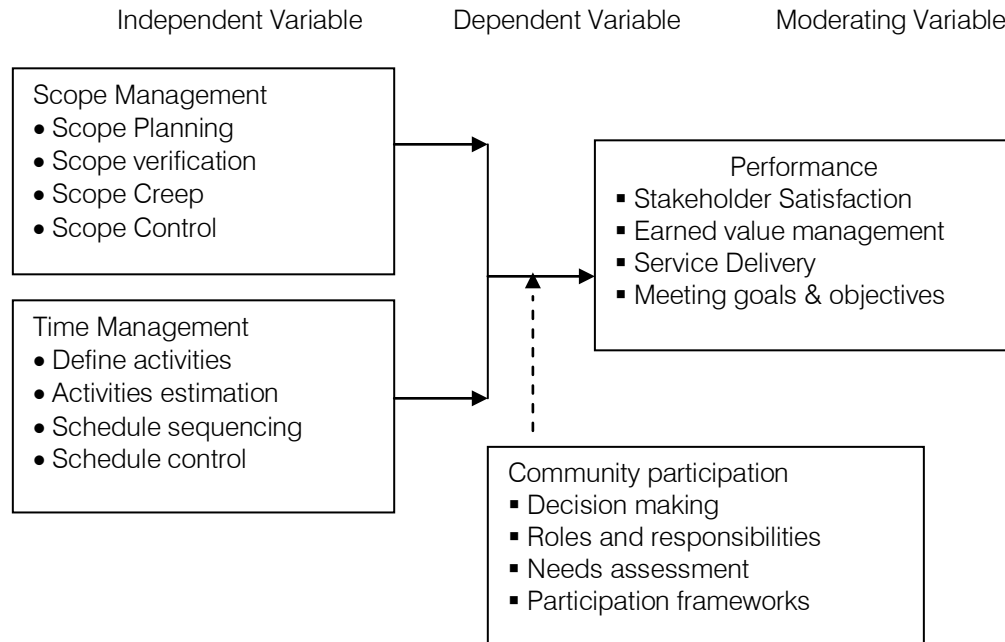
b) *Complexity Theory*

The theoretical foundation of complexity theory is made of program performance (Koskcia, 2000 cited by Richards (2010). The complexity theory as discussed by Curlee & Gordon (2011) is based upon the management belief that total order does not allow for enough flexibility to address every possible situation. The complexity exists in projects. The complexity theory acknowledges that projects by nature have parts that work together as a system. Because of this, even though some people would be unhappy with the changes; a lot of processes have to result from the changes. Certain impediments have to be removed, certain procedures that would be unproductive have to be changed or modified.

Complexity theory states that critically interacting components self-organize to form potentially evolving structures exhibiting a hierarchy of emergent system properties, (Lucas, 2009). During project life cycle, many team members will be concerned about how the project achievement were met as expected. The project team sometimes can be behind the schedule, delay challenge and project will probably end over budgeted. The complexity of the project requires the understanding of the management of the triple constraints to improve performance of the construction projects.

The complexity theory leads to the development of disruption model discussed by Baca (2005) which states that there are disruptions of the project that result from change requests because every time a change request comes along, the core team must stop the motion of project accomplishments to analyze the request. The forward motion stops, they do some analysis, they do a little more work on the project while they wait for an answer. This process has to determine whether the change request is out time and cost for the scope, to decide if the project is to be expended or only rectified.

V. CONCEPTUAL FRAMEWORK



VI. VARIABLES REVIEW

a) Project Scope Management

Project scope management is the process which involves definition and mapping appropriately. It is the procedure of ensuring that a project comprises all of the necessary activities for the achievement of specific targeted objectives. Project scope enlists structure of a project and base of other related factors especially cost and time. Project success relates to effectiveness cum effort given to its scope management; if the project boundaries are undefined then its objectives are not clear. PMI (2014) postulates that scope management in projects includes ascertaining that the project has all tasks and activities necessary for it to be completed successfully.

Project scope planning is defining of the project boundaries and the expected deliverables from the project (Adek, 2016). The basic matrix that is used for scope planning analysis involves the initiation, planning and definition. This can call for verification and change control when interspersed (Band & Pretorius, 2016). Scope inputs requires the description of program deliverable, selection program criteria, planning, strategically and historical information. Tools and techniques involved are methods of program selection and expert judgment of the same. The initiation phase output involves the identification program charter, project manager assignment, and the constraints and assumptions identification (Baymount, 2015). The project scope planning also includes the deliverables descriptions, assumptions and constraints, program charter. The project tools and techniques involved

consist of a benefit/cost, identification of alternatives deliverable analysis (Apiyo & Mburu, 2014).

Omondi (2017) posits that uncontrolled variations in a project's scope (scope creep) represents propensity of a program or project to incorporate a larger number of tasks or duties as compared to the initial planned tasks and duties which were specified, and this can frequently lead to higher than arranged project costs and addition of the project duration. Conceptually, scope creep is actually additional tasks and duties which were never planned for in the project thus likely to have an effect on the cost and time of the project (Osedo, 2015). As the project progresses, project team gains more knowledge, and this leads to scope changes. Jones, Snyder, Stackpole & Lambert (2011) add that scope change is common on projects, meaning that it is not a harm to make changes during the lifecycle of the project (Rugenyi, 2015).

According to Sikudi and Otieno (2017) project activities can be well controlled through effective scope which is well planned and tracked. The scope control is monitoring of duties and tasks of the project to ensure they are achieved as per the scope management plan. Osedo (2015) found out that delivery of the project requires scope control, adequate project documentation, enhanced leadership with effective communication to ensure project deliverables are achieved. The project variances are due to lack of scope control in the projects (Nibyiza, 2015). The expected outputs of the scope controlling process can lead to changes of the request, updating of the project management plan, updates on the documentation of the project activities, updating of the asset's organizations process and work performance (Rugenyi, 2015).

b) *Project Time Management*

Project time management refers to a component of overall project management in which a timeline is analyzed and developed for the project completion. Project time management consists of six different components or steps (Lukale, 2015). The project time management is dynamic and may require input from several different teams each with individual project time management process in order to integrate the various interdependent component parts of the project to achieve the project deliverable(s) (Osedo, 2015).

Raza and Shah (2012), project time management is the procedure of managing time to ensure that project activities and tasks are achieved as expected. It is seen as the scheduling of project activities and involves the process of defining the project activities and tasks, sequencing of activities, activity duration estimation and resources activity estimation (Rugenyi, 2015). Project time management encompasses the activity definition which is the identifying and scheduling different components of the project management sequence that are required for completion of project deliverables (Sikudi & Otieno, 2017; Rugenyi, 2015).

Project time management also is the activity sequencing which is the process of project time management that defines the order in which deliverables must be completed (Githenya & Ngugi, 2014). Project time management can be understood to consist of the activity resource estimation which is the identification and definition of the different types of quantities and qualities of resources and materials to enhance the deliverables (Lukale, 2015; Rugenyi, 2015). This can improve on the estimation of the activity duration in terms of the estimation of the duration or timelines to enhance the deliverables (Munyoki, 2015; Raza & Shah, 2012).

Project time management improves the resource scheduling in order to be consistent with the project planned activities, resources and timeliness. The aim of the project time management is to control project activities and tasks as per the plan and try to remove any barrier to the project schedule (Rugenyi, 2015; Raza & Shah, 2012). Project time management can enhance performance of the project as the deliverables can be easily achieved to the stakeholder's satisfaction in consideration with the time, scope, cost and quality (Sikudi & Otieno, 2017).

c) *Community Participation*

A community may be defined as a group of people living in a geographical area, who have identical culture, beliefs, values, traditions and are united with common interest. It is this common interest that brings them together to share a territory. According to Anyanwu (2009), a community is a social group, occupying a

more or less defined geographical area, and based on the feeling that people have for one another. Community participation involves bringing people together with the common goal of improving their social, legal, economic, political, educational and cultural wellbeing for a better living livelihood. Thus, peoples' participation is an indispensable element for effective community development. People's participation cannot be dispensed within development efforts (Mohammad, 2010).

Participation and other related concepts like sustainability and empowerment are at the center of development discourse (Blackman, 2003) and it may be argued that participation is as old as democracy itself. For the communities in order to enhance the realization of community participation development goals, especially where government patronage was not easy to get all the time whereas organized development efforts through community development program have become popular today. Dan (2011) stated that situation where community bodies are mere small organization operating within a larger social environment that is plagued with poverty, low standard of living and economic vagaries. Hence they may lack the basic economic resources to initiate or sustain project.

Community efforts have been carried out to tackle local problems in different localities with external support or intervention. This has been a common practice long before the colonial rule. Abegunde (2009) stressed that during the colonial period and after independence, government at different levels supported communities to develop their locality in different ways, and for many years emphasis was on cooperation and self-help among the people. Zaden, (2010) stated that Community development program is influenced by the ability of major stakeholders to mobilize people for participation. Generally, people who are informed about a community issue and are interested in resolving it, feel that they can be more effective in working with groups.

A common objective of community bring such people together to develop some awareness and feeling for the need to work together at solving their common problems. This is the type of community that Christenson, (2005) referred to as functional community. In a similar manner, community is also referred to as a legal, political or administrative unit. In this sense a community will feature the formulation of laws to guide the conduct of members, and this is what is required to ensure its existence. The regulation or laws are enforced by an administrative structure.

d) *Performance*

The term program performance is quite ambiguous especially in the construction projects, which are considered and evaluated from the project management triangle perspective (Njau & Ogolla, 2017).

Performance is the accomplishment of a given task in this case a project measured against preset known standards of accuracy, completeness, cost, and speed (Omondi, 2017). This is the success level of a program based on the following criteria: effectiveness, relevance, impact, efficiency, timeliness and sustainability. This model suggested that a project is successful when it is completed on time, budget estimates and meets all predetermined specifications. However, the concept of program performance has been enriched and expanded beyond the three project constraints (Hassan & Adeleke, 2019).

Kabirifar and Mojtaahidi (2019) recommended the inclusion of stakeholder satisfaction and realization of benefits as an additional measure of program performance. They noted that a project may be completed on time, budget and meet all pre-established requirements, but fail to meet the expectations of key stakeholders such as the customer. Stakeholders' satisfaction can be an important measure of project success in the building construction industry (Rugenyi, 2015). Due to its technical nature, key stakeholders may not be able to articulate their expectations and preferences at the beginning of the projects. Therefore, projects managers have the responsibility of ensuring that key stakeholders are involved at every step of the project so as they can clarify their expectation on continual basis (Osedo, 2015; Sikudi & Otieno, 2017). The current study will measure the performance of county funded construction projects by focusing on the achievement of the objectives, stakeholder satisfaction, benefit realization and completion within cost.

VII. EMPIRICAL REVIEW

Hassan and Adeleke (2019) investigated the effects of project triple constraint based on the building projects in Kuantan Malaysia. The study employed quantitative research technique because it is most suitable for the investigation. The findings clearly showed that the project triple constraint had a positive relationship with the construction companies' building projects. Kabirifar and Mojtaahidi (2019) analyzed and ranked engineering, procurement and construction phases which are critical activities across construction projects of large-scale residential in Iran. The scope, time, and cost were the triple constraints of project management and leading factors in defining the program performance. The results indicated that engineering design, project planning and controls are significant factors contributing to the program performance. In addition, engineering has a pivotal role in program performance and this significance is followed by the construction phase.

Rugenyi and Bwisa (2016) study used on the triple constraints and projects performance in Nairobi from the project manager perspective. The study

revealed that statistically no significant relationship between triple constraint and projects management in Nairobi. Relatedly, Omondi (2017) examined triple constraints specifically project scope management and project completion, schedule management and cost management on project completion. A descriptive survey design was adopted in the study and involved quantitative methods. It was established that the relationship was significant between the scope, schedule and cost on project completion of the NGO projects based in Nakuru County, Kenya.

Nibyiza (2015) study focused on the scope change management as a means of successful project implementation in Rwanda. Specifically, the study examined the scope change; adjustment of project activities, changing project cost, time on product or service quality derived and identification of the challenges associated with changing the project scope in Akazi Kanoze projects. The research findings indicated that time, scope and cost in project affect the success of the project ultimately. Raza and Shah (2012) study sought to investigate how the project triple constraints impacted projects in the IT industry. They were determined in terms of environment for work of the project team members in terms of the satisfaction of the job, remuneration, and work hours. Based on the study findings it was revealed that the work environment affected performance of the projects in the IT industry in consideration with project constraints.

VIII. RESEARCH METHODOLOGY

This study was guided by positivistic research philosophy which holds the view that the reality is stable and can be observed and explained from an objective point of view (Flick, 2018). This study used a combined descriptive survey research design and correlational research design. The study target population will be 24,000 social housing projects implemented by affordable housing program. The sample was arrived at using the Slovin's sample size determination formula for categorical data. 393 social housing units project was the selected sample size.

This study collected both primary and secondary data. Thus, questionnaires are important tools for collection of primary data due to their many positive attributes discussed herein. After, the questionnaires are administered and collected, data was checked for completeness, accuracy and consistency then presented for editing, classification, cleaning, transformation tabulation and coding, quantitative and qualitative techniques were used. Statistical package for Social Science Software version 24 software was used to run different statistical tests. Qualitative data analysis by use of content analysis. The data was presented using frequency tables, pie charts and graphs and interpreted appropriately (Crewell,

2014), Correlation analysis (Pearson) was used to carry out inferential data analysis to determine the direction and strength of the relationship among the variables. Regression models (as show below) were also fitted.

The study used multiple regressions analysis (stepwise method) to establish the moderating effect of organizational culture (z) on relationship between independent variable and dependent variable. The study performed individual tests of all independent variables to determine which regression coefficient may be zero and which one may not. If the p-value is greater than 0.05

then the model is not significant and cannot be used to explain the variations in the dependent variable H_0 was rejected if and only if $t_{calc} \geq t_{crit}$.

IX. RESEARCH FINDINGS

The sample size of the study comprised of 393 project managers from social housing units project however, 372 were duly filled and returned. This implies that the response rate of 94.7% was adequate for analysis, drawing conclusions and reporting.

X. DESCRIPTIVE STATISTICS

Table 1: Descriptive Statistics on Project Scope Management

Statement	Mean	Std. Dev.
All project stakeholders are engaged in scope management	3.982	1.370
Scope control is one of the key factors considered before and after the implementation of the project.	3.948	1.263
There is clear scope definition to avoid scope creep in the project	3.889	1.381
A clear scope plan is shared with the project team before project is implemented	3.863	1.326
Scope is well initiated among all relevant stakeholders in the project.	3.777	1.275
Scope verification is normally conducted during the implementation of every project.	3.738	1.320
We can manage all types of services required by clients within the shortest time possible	3.698	1.331
Aggregate Score	3.842	1.324

From the findings in Table 1, the aggregate mean value was 3.842 which suggest that on average, the respondents agreed with the statements on project scope management on performance of affordable housing program in Kenya. Specifically, the findings showed that the respondents agreed that all project stakeholders are engaged in scope management as indicated by a mean value of 3.982 and standard deviation of 1.370. They also agreed that scope control is one of the key factors considered before and after the implementation of the project (M=3.948, SD=1.263); there is clear scope definition to avoid scope creep in the project (M=3.889, SD=1.381); they also agreed that a clear scope plan is shared with the project team before project is implemented (M=3.863, SD=1.326). In addition, respondents agreed that: scope is well initiated among all relevant stakeholders in the project

(M=3.777, SD=1.275); scope verification is normally conducted during the implementation of every project (M=3.738, SD=1.320); and that they can manage all types of services required by clients within the shortest time possible (M=3.698, SD=1.331).

The findings agree with PMI (2014) who postulates that scope management in projects includes ascertaining that the project has all tasks and activities necessary for it to be completed successfully. Also, the basic matrix that is used for scope planning analysis involves the initiation, planning and definition. This can call for verification and change control when interspersed. It also agrees with Band and Pretorius, (2016) that scope inputs requires the description of program deliverable, selection program criteria, planning, strategically and historical information.

a) Project Time Management

Table 2: Descriptive Statistics on Project Time Management

Statement	Mean	Std. Dev.
The schedule is normally developed prior to any project activity	3.994	1.476
Activity duration is normally estimated on time	3.961	1.476
Proper schedule networks are designed using current software tools	3.955	1.546
Sequencing of activities is normally conducted for all the projects and activities so that they are performed in an order of priority.	3.915	1.343

Activity resources estimation is usually a key item in schedule management of project activities.	3.856	1.525
Project team observes definition of activities before any project takes off.	3.836	1.220
Controlling schedule is considered a key activity to ascertain variations between planned versus actual in terms of time management.	3.836	1.426
Aggregate Score	3.908	1.430

From the findings presented in Table 2, the mean aggregate Score was 3.908, an indication that on average, the respondents agreed with the statements about project time management and performance of affordable housing program in Kenya. Specifically, the findings showed that respondents agreed that the schedule is normally developed prior to any project activity (M=3.994, SD=1.476); activity duration is normally estimated on time (M=3.961, SD=1.476); and that proper schedule networks are designed using current software tools (M=3.955, SD=1.546). The study also established that sequencing of activities is normally conducted for all the projects and activities so that they are performed in an order of priority (M=3.915, SD=1.343); activity resources estimation is usually a key item in schedule management of project activities (M=3.856, SD=1.525); project team observes definition

of activities before any project takes off (M=3.836, SD=1.220); and that controlling schedule is considered a key activity to ascertain variations between planned versus actual in terms of time management (M=3.836, SD=1.426).

These findings agree with Raza and Shah (2012) that project time management is scheduling of project activities and involves the process of defining the project activities and tasks, sequencing of activities, activity duration estimation and resources activity estimation. It also concurs with Sikudiand Otieno (2017) that project time management encompasses the activity definition which is the identifying and scheduling different components of the project management sequence that are required for completion of project deliverables.

b) Community Participation

Table 3: Descriptive Statistics on Community Participation

Statement	Mean	Std. Dev.
There is timely response to information with regards to community issues	3.961	1.149
projects objectives, role and responsibilities are clearly understood by the community	3.955	1.199
Community members are involved in the decision making of the projects.	3.902	1.345
The project team in collaboration with the community they take part in corporate social responsibility	3.836	1.234
Community have proper knowledge and skills on project implementation	3.836	1.313
Community needs are well identified within the project implementation.	3.803	1.248
Aggregate Score	3.882	1.248

As presented in Table 3, the aggregate mean score was 3.882, an indication that on average, the respondent agreed with the various statements about moderating community participation on the relationship between project management iron triangle and performance of affordable housing program in Kenya. The findings specifically show that the respondents agreed that there is timely response to information with regards to community issues (M=3.961, SD=1.149); that projects objectives, role and responsibilities are clearly understood by the community (M=3.955, SD=1.199); and that community members are involved in the decision making of the projects (M=3.902, SD=1.345). The study further established that the project team in collaboration with the community they take part in corporate social responsibility (M=3.836, SD = 1.234); community have Proper knowledge and skills on project Implementation (M = 3.836, SD= 1.313); and that ommunity needs

are well identified within the project implementation (M=3.803, SD=1.248).

The study findings concur with Mohammad, (2010) that peoples' participation is an indispensable element for effective community development. He further explained that community participation brings people together with a common goal of improving their social, legal, economic, political, educational and cultural wellbeing for a better living livelihood. It also concurs with Christenson, (2005) that the common objective of community participation is to bring people together to develop some awareness and feeling for the need to work together at solving their common problems.

c) Performance

Table 4: Descriptive Statistics on Performance

Description	Mean	Std. Dev.
There is always a higher percentage in achieving the project milestones	4.021	1.265
Project is well scheduled within specified time, cost and quality.	3.988	1.182
Before the beginning of any project, all stakeholders must agree on project deliverables	3.902	1.235
There is proper monitoring and evaluation on projects deliverables and performance	3.902	1.235
Projects implemented are normally done within the planned scope	3.896	1.21
Projects delivered normally satisfy our stakeholders expectations	3.81	1.142
There is earned value for money on projects implemented.	3.738	1.168
Aggregate Score	3.894	1.205

The aggregate score was 3.894 as shown in Table 4; this was an indication that on average, the respondents agreed with various statements regarding performance of affordable housing program in Kenya. Specifically, the findings showed that respondents agreed that there is always a higher percentage in achieving the project milestones (M=4.021, SD=1.265); project is well scheduled within specified time, cost and quality (M=3.988, SD=1.182); and that before the beginning of any project, all stakeholders must agree on project deliverables (M=3.902, SD=1.235). The findings further showed that respondents agreed that there is proper monitoring and evaluation on projects deliverables and performance (M=3.902, SD=1.235); projects implemented are normally done within the

planned scope (M=3.896, SD=1.21); projects delivered normally satisfy their stakeholders expectations (M=3.81, SD=1.142); and that there is earned value for money on projects implemented (M=3.738, SD=1.168).

The findings concurs with Rugenyi (2015) who explained that a project may be completed on time, budget and meet all pre-established requirements, but fail to meet the expectations of key stakeholders such as the customer. Stakeholders' satisfaction is therefore an important measure of project success in the building construction industry. It also agrees with Osedo (2015) that projects managers have the responsibility of ensuring that key stakeholders are involved at every step of the project so as they can clarify their expectation on continual basis.

XI. CORRELATION ANALYSIS

Table 5: Correlation

		Performance	Scope Management	Time Management
Performance	Pearson Correlation	1		
	Sig. (2-Tailed)			
	N	372		
Scope Management	Pearson Correlation	.669**	1	
	Sig. (2-Tailed)	.000		
	N	372	372	
Time Management	Pearson Correlation	.725**	.261**	1
	Sig. (2-Tailed)	.000	.000	
	N	372	372	372

The findings in Table 5 shows that scope management and performance have a strong positive and significant relationship (r=0.669, p=0.00). The relationship was significant since the p-value was less than the selected level of significance. The relationship between time management is also seen to be strong (r=0.725). Since the p-value (0.000) is less than the selected level of significance (0.05), the relationship was

considered to be significant. These findings suggest that all the four independent variables (scope management and time management) have a strong relationship with performance of affordable housing program in Kenya. The study therefore computed regression analysis to further understand the relationship nature between these variables.

XII. REGRESSION ANALYSIS

a) Influence of Project Scope Management on Performance of Affordable Housing Program

A univariate analysis was conducted to investigate the influence of project scope management

on performance of affordable housing program in Kenya. The null hypothesis stated:

H_{01} : Project scope management does not significantly influence performance of affordable housing program in Kenya.

Table 6: Model Summary for Project Scope Management and Performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.669 ^a	.448	.443	.26099

a. Predictors: (Constant), Scope Management

Adjusted R² shows the variation in the dependent variable due to changes in the independent variable. Table 6 shows that adjusted R squared was 0.443; this is an indication that at 95% confidence interval, there was variation of 44.3% in performance of

affordable housing program in Kenya. This implies that 63.7% of the performance of affordable housing program in Kenya is accounted for by other factors not considered in the model.

Table 7: Analysis of Variance for Project Scope Management and Performance

Model	Sum of Squares	df	Mean Square	F	Sig.	
1	Regression	0.637	1	0.637	9.362	.000 ^b
	Residual	25.16	370	0.068		
	Total	25.797	371			

a. Dependent Variable: performance
b. Predictors: (Constant), Scope Management

From the analysis of variance (ANOVA), the study found out that the regression model was significant at 0.000 which is less than the selected level of significance (0.05). Therefore, the data was ideal for making a conclusion on the population parameters. The F calculated value was greater than the critical value

(9.362 > 3.867), an indication that project scope management significantly influences performance of affordable housing program in Kenya. The significance value was less than 0.05 indicating that the model was significant.

Table 8: Coefficients for Project Scope Management and Performance

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1	(Constant)	1.988	.219	9.062	.000
	Scope Management	.486	.058	.451	8.328

a. Dependent Variable: performance

The regression equation was:
 $Y = 1.988 + 0.486 X_1$

The above regression equation revealed that holding scope management to a constant zero, performance will be at a constant value of 1.988. The findings also show that scope management is statistically significant in explaining performance ($\beta = 0.486$, $P=0.000$). This indicates that scope management positively and significantly relates with performance of affordable housing program in Kenya. The findings also suggest that a unit increase in project scope management would lead to an increase in performance of affordable housing program in Kenya by 0.486 units. The relationship is statistically significant as the p-value (0.000) was less than the significance level (0.05). Therefore we can reject the null hypothesis that "Project scope management does not significantly

influence performance of affordable housing program in Kenya".

b) Influence of Project Time Management on Performance of Affordable Housing Program

A univariate analysis was conducted to investigate the influence of project time management on performance of affordable housing program in Kenya. The null hypothesis stated:

H_{02} : Project time management does not significantly influence performance of affordable housing program in Kenya.

The findings were discussed in three tables.

Table 9: Model Summary for Project Time Management and Performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.725 ^a	.526	.520	.24844
a. Predictors: (Constant), Time Management				

From the findings, the value of adjusted R₂ was 0.520 which suggests that 52% variation in performance can be attributed to changes in project time management. The remaining 48% suggest that there are other factors that can explain variation in performance

which were not included in this model. The findings further show that project time management and performance affordable housing program in Kenya are strongly and positively related as indicated by correlation coefficient (R) value of 0.725.

Table 10: ANOVA for Project Time Management and Performance

Model	Sum of Squares	df	Mean Square	F	Sig.	
1	Regression	0.663	1	0.663	10.701	.000 ^b
	Residual	22.940	370	0.062		
	Total	23.603	371			
a. Dependent Variable: performance						
b. Predictors: (Constant), Time Management						

The results indicate that the model was significant since the p-value (0.000) was less than 0.05 thus the model is statistically significance in determining the influence of project time management on performance of affordable housing program in Kenya.

Further, the F-calculated (10.701) was found to be more than the F-critical (3.867) which shows that the model was fit in establishing the influence of project time management on performance of affordable housing program in Kenya.

Table 11: Coefficients for Project Time Management and Performance

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.820	.195		9.327	.000
	Time Management	.525	.051	.527	10.232	.000
a. Dependent Variable: Performance						

The regression equation was:
 $Y = 1.820 + 0.521 X_2$

The above regression equation revealed that holding time management to a constant zero, performance will be at a constant value of 1.820. The findings also show that time management is statistically significant in explaining performance ($\beta = 0.521$, $P = 0.000$). This indicates that time management positively and significantly relate with performance. The findings also suggest that a unit increase in time management would lead to an increase in performance of affordable housing program in Kenya by 0.521 units. Therefore we can reject the null hypothesis that "Project time

management does not significantly influence performance of affordable housing program in Kenya".

c) *Moderating Influence of Community Participation on the Relationship between Project Management Triple Constraints and Performance*

The null hypothesis stated:

H₀₃: Community participation has no moderating influence on the relationship between project management triple constraints and performance of affordable housing program in Kenya.

Table 12: Model Summary for Community Participation, Project Management Triple Constraints and Performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.873 ^a	.762	.754	.08185
2	.894 ^b	.799	.787	.12613

The R squared for the relationship between project management triple constraints and performance of affordable housing program in Kenya was 0.754,

which implied that 75.4% of the performance of affordable housing program in Kenya can be explained by scope management, time management, cost

management and project quality management. However, in the second model, in Table 12, which constituted scope management, time management, cost management, project quality management, scope management* community participation, time management* community participation, the r-squared

was 0.784. This implies that the introduction of community participation in the second model led to an increase in r-squared, showing that community participation moderates the relationship between project management triple constraints and performance of affordable housing program in Kenya.

Table 13: Moderated ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.796	4	0.449	26.423	.000 ^b
	Residual	6.239	367	0.017		
	Total	8.035	371			
2	Regression	4.568	8	0.571	35.705	.000 ^c
	Residual	5.808	363	0.016		
	Total	10.376	371			

From the findings, the F-calculated for the first model, as shown in Table 12, was 26.423 and for the second model was 35.705. Since the F-calculated for the two models were more than the F-critical, 2.396 (first model) and 1.964 (second model), the two models were

good fit for the data and hence they could be used in predicting the moderating effect of community participation on the relationship between project management triple constraints and performance of affordable housing program in Kenya.

Table 14: Coefficients for Community Participation, Project Management Triple Constraints and Performance

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.484	.153		9.699	.000
	Scope Management	.245	.075	.256	3.242	.001
	Time Management	.195	.036	.208	5.475	.000
2	Scope Management*Community Participation	0.308	0.066	0.226	4.667	.002
	Time Management*Community Participation	0.265	0.083	0.057	3.193	.036

a. Dependent Variable: Employee Performance

From the coefficients table, the following regression model was fitted:

$$Y = 1.484 + 0.245X_1 + 0.195X_2 + 0.308 X_1 * M + 0.265 X_2 * M + \epsilon$$

From the findings, it can also be seen that scope management* community participation has a positive influence on performance of affordable housing program in Kenya ($\beta = 0.308$). The influence was significant since the p-value obtained ($P = 0.002$) was less than the selected level of significance (0.05). Therefore, introduction of community participation as moderating variable for project scope management explains 0.308 units of performance compared to 0.245 explained when the variable is not moderated (model 1). Therefore community participation has a positive influence on the relationship between project scope management and performance of affordable housing program in Kenya. Therefore, we reject the null hypothesis that: *Community participation has no moderating influence on the relationship between project scope management and performance of affordable housing program in Kenya.*

The findings also show that time management* community participation has a positive influence on

performance of affordable housing program in Kenya ($\beta = 0.265$). The influence was significant since the p-value obtained ($P = 0.036$) was less than the selected level of significance (0.05). Therefore, introduction of community participation as moderating variable on time management explains 0.265 units of performance compared to 0.195 explained when the variable is not moderated (model 1). Therefore community participation has a positive influence on the relationship between project time management and performance of affordable housing program in Kenya. Thus, we reject the null hypothesis: *Community participation has no moderating influence on the relationship between project time management and performance of affordable housing program in Kenya.*

XIII. CONCLUSIONS

The first objective of the study was to investigate the influence of project scope management on performance of affordable housing program in

Kenya. The study found that scope management is statistically significant in explaining performance. This indicates that scope management positively and significantly relates with performance of affordable housing program in Kenya. The findings also suggest that a unit increase in project scope management would lead to an increase in performance of affordable housing program in Kenya. Based on the findings, the study concludes that project scope management significantly influences performance of affordable housing program in Kenya.

The second objective of the study was to establish the influence of project time management on performance of affordable housing program in Kenya. The study established that time management is statistically significant in explaining performance. This indicated that time management positively and significantly relate with performance. The study also found that a unit increase in time management would lead to an increase in performance of affordable housing program in Kenya. Therefore based on the findings, the study concludes that project time management significantly influences performance of affordable housing program in Kenya.

The final objective of the study was to examine the moderating effect of community participation on the relationship between project management triple constraints and performance of affordable housing program in Kenya. The study found that community participation has a positive influence on the relationship between project scope management and performance of affordable housing program in Kenya. On time management, the study established that community participation has a positive influence on the relationship between project time management and performance of affordable housing program in Kenya.

Based on these findings, the study concludes that community participation has moderating influence on the relationship between project management triple constraints and performance of affordable housing program in Kenya.

XIV. RECOMMENDATIONS

The project scope can be improved by setting clear goals and objectives. The goals should have the proposed idea and then define the objectives that will guide the achievement of the set goal. The challenge of unrealistic deadlines can be resolved by having an open communication with the clients to determine whether there are other factors that drive the project deadline. Also, through the adoption of impeccable planning, alternative analysis and proper communication on projects real-time progress to project participants, project managers can deal with project deadlines. To deal with the challenge of changing scope, project managers should develop a clear schedule, determine project goals, ensure everyone is in the same page,

make realistic assumptions regarding availability of resources, and deadlines to achieve quality results.

It is also important to set goals such as SMART and CLEAR to guide the project manager to set effective goals and therefore be in a position to deal with time related challenges in project management. Project managers should develop a schedule that clearly outlines the responsibility of each member and when they should complete their task to ensure timely completion of projects. This can be achieved by adopting software which can help remind people on the set deadlines instead of relying on list of dates. To ensure that every one stays updated with the project progress, project managers should adopt various collaborative and project management software. This ensures that there is transparency in projects and also team accountability.

For participants to be representative of the wider community it is necessary either that they are elected, or that they identify with it and have its interests at heart. To ensure equity, it is important that projects managers include people of diverse backgrounds, people with disabilities, youth, people from Indigenous groups. Before starting a project, it is important to establish the views of the community. This is through summing the separate opinions of individual community members (e.g., via surveys) or by seeking to establish the collective views of community members (e.g., by focus groups or community forums). Generally, the challenges that come with community participation can be overcome through the development of a comprehensive public engagement plan.

XV. SUGGESTIONS FOR FURTHER STUDIES

The study explained 75.4% variation in performance of affordable housing program in Kenya; the study recommends a study to be conducted on other factors that can influence performance such as project control and project motivation. The study focused on housing projects; this study can be replicated in other government projects such as dams and stadium construction. A study can also be conducted incorporating the use of secondary data where financial records on project performance can be used.

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Lands Node: A Successful Experience of Interoperability in Favor of the Victims of Colombia

By Lucas Urdaneta

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Abstract- The following is a case study regarding an interoperability experience implemented in Colombia for the development of the land restitution public policy. After an academic review of the concept of interoperability, this document contrasts the different postulates it encompasses with a concrete case implemented in Colombia since 2014. With the help of 12 Colombian State entities, the direct support of the Ministry of Information Technology and Communications and the leadership of the Land Restitution Unit, this experience reflects the complexity, the benefits and also the challenges involved in implementing an interoperability initiative; in this case horizontal interoperability. Several lessons can be drawn from the review of this still ongoing experience.

I. INTRODUCTION

Information and Communication Technologies, ICT's, play a fundamental role in governments around the world and this cannot be ignored. This is the understanding of Criado and Gil-García (2013) who see them as a means to increase the effectiveness, efficiency, productivity, and quality of public services. They are a fundamental component of what academic literature has called e-government, understood as the use of these technologies in public administrations in order to improve service provision and public governance itself (Criado, Gascó & Jiménez, 2011).

A key feature of this type of governance is the importance of intra- and inter-governmental collaboration as a means of reducing redundancy in operations and saving time in processes (Abu-Shanab, 2015). And this is where the concept of interoperability comes into play, as that ability, typical of e-governments, to cooperate between agencies to achieve precise goals and/or services -although we will go into more detail on this conceptual issue later.

Researchers Lee & Hoon Kwak (2012) classify these 2.0 governments according to the level at which they make use of these technologies to carry out their functions and interact with citizens. Thus, on a sliding scale, they understand level 4 agencies as those where governments collaborate with other agencies by using government data, as well as their inputs and feedback, therefore giving added value to the public services provided. This is, according to the authors, a level where governments, through open collaboration, develop data analysis and new capabilities to obtain new insights,

and thus improve their decision making, by being able to rely on a significant volume of official information. They conclude that this produces synergistic effects through the collaboration of many parties and leads to time savings, better quality and greater innovation for the services and policies implemented by the government (ibid.).

Within this context the Lands Node project comes into place, led by the Land Restitution Unit (hereinafter LRU), a public entity of the Colombian government whose main objective is: '(...) to serve as an administrative body of the National Government for the restitution of land to the dispossessed' (Bill 1448 of 2011) by the internal armed conflict. This is a project that, using interoperability practices, seeks to bring together various national government entities to share information related to the land restitution process.

This case study seeks to reflect how, through this recent experience, Colombia's government managed to materialize interoperability, with the use of ICTs, in the implementation of a public policy. The present document will start with a brief overview of the concept and its main characteristics to continue with a description of the Lands Node project and how, in its application and results, the various components of interoperability can be seen in play as well as how the government, through the leadership of the LRU, has managed to address its multiple challenges.

II. INTEROPERABILITY: DEFINITIONS AND CHARACTERISTICS

This is a concept that has been recently explored by the academy and that, despite its relative novelty, has had a wide and varied development. Perhaps one of the most complete and concise definitions is provided by Criado, Gascó and Jiménez (2010) who summarize it as follows:

Interoperability is the ability of disparate and diverse organizations and systems to interact with common and agreed upon objectives and to obtain mutual benefits. Interaction implies that the organizations involved share information and knowledge through their business processes, by exchanging data between their respective information and

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communication technology systems'. (Criado, Gascó & Jiménez, 2010: 5)

Gil-García and Criado (2017) also understand it as an ability of the systems that, by means of ICTs, manage to exchange data, information and knowledge within the framework of standards and action guidelines that describe, in turn, the way in which organizations have agreed to interact with each other.

For the Australian Government, in its e-Government initiative, interoperability is the *'Ability to transfer and use information in a uniform and sufficient manner between various organizations and information systems'* (Australian Government, 2006). Similarly, for the European Commission's IDABC it is the *'ability of ICT-based systems and the business or government processes they are based on to exchange data and enable the sharing of information and knowledge'* (IDABC, 2004: 5).

According to the Bases for an Ibero-American Interoperability Strategy (2010), quoted by Criado, Gascó and Jiménez (2011), it is also an ability of different organizations to interact, based on agreed objectives and with the ultimate goal of obtaining mutual benefits.

Complementing the above, for Pardo, Gil-García and Burke (2008) quoted by Luna Reyes (2017), interoperability is not an end in itself, but a means that seeks to create public value from the coordination allowed by ICTs to improve public decisions, as well as the design or implementation of a public policy. In the Latin American context, ECLAC (2007) lies on the European Commission's definition who sees it as: *'the ability of ICT systems, and the business processes they support, to exchange data and enable the sharing of information and knowledge'* (Cepal, 2007: 13).

Finally, the Colombian government defines the concept in its most recent legislation on the matter, Decree 1413 of 2017, which establishes a regulatory framework with which it, and in particular the Ministry of Information Technology and Communications, leads and works together with the various government entities in the area of e-government. On the one hand, they define an Interoperability Framework as a:

'(...)set of principles, policies and recommendations that seeks to facilitate and optimize the collaboration between private organizations and state entities to exchange information and knowledge, within the framework of business processes, in order to facilitate the delivery of services to citizens, businesses and other entities to exchange information, documents and data online' (Article 2.2.17.1.3).

On the other hand, they refer to the Interoperability Service as:

'(...) one that provides the necessary capacities to guarantee the adequate flow of information and interaction between the information systems of the

State entities, allowing the exchange, integration and sharing of information, with the purpose of facilitating the exercise of their constitutional and legal functions (...)' (Article 2.2.17.2.1.1.).

Academic research has advanced and classified the concept according on how it operates. Thus, a first technical interoperability is understood as the one related to the technological components of the systems of the entities participating together, in the sense that these components must be able to work together providing data transfer mechanisms through the existing computer systems (Criado et al. 2010). For Cepal (2007) this type of interoperability deals with technical issues, such as hardware and software, which are fundamental to the interconnection of systems. These issues make use of tools such as open interfaces, interconnection services, data integration and, what they call, middleware; all depending on the exchange of data, but also guaranteeing security in the handling of information.

The other type is called semantic interoperability and Criado et al. (ibid.) define it as that which is responsible for ensuring the precise meaning of the information exchanged so that it can be understood by any application. This form of interoperability is, thus, the one that allows the tools that enable this exchange to combine the information shared by different sources and to integrate it in order to be understood by all those who feed on it. Similarly, for Cepal (ibid.) this type of interoperability ensures that the shared information is understood by the applications involved in this transactional exercise, allowing the systems to combine the information received with their own means and tools so that it can be properly processed for their purposes.

Finally, we have the organizational interoperability, understood as the indispensable collaboration between the organizations that are going to exchange information, by means of internal structures of government created for this purpose (Criado et al. ibid.). This type of interoperability is what allows coordination to materialize by aligning the administrative processes of the different entities that are part of the exchange (ibid.). For Cepal (ibid.), this part is concerned with defining objectives and processes that facilitate collaboration between entities that seek this exchange, despite the fact that each has its own administrative structure and internal process. According to Cepal, this interoperability also defines what services will be available and how they will be affordable.

Other has been said about the characteristics of interoperability that make it such a complex process, going beyond the merely technological. For Criado et al. (ibid.) it is a process that requires the removal of many barriers, not only technological but also semantic, organizational, legal-normative and even cultural. To this end, it refers to a necessary governance of

interoperability, understood as the agreements -and the spaces for dialogue where these agreements are defined- between governments and actors participating in these processes, in order to define how it will be carried out (ibid.).

For Criado, Gascó and Jiménez (2011), interoperability does not refer only to technology; although it seeks to use different products from multiple agents, the way in which it is achieved leads us to a necessary definition of policies, norms and standards to achieve this cooperation between different public organizations. Similarly, for Gil-García, Criado and Téllez (2017), technology alone does not solve all the challenges involved in interoperability since it is a complex process that stems from the necessary interdependence of technical aspects, but also organizational and public policy itself.

According to Dawes (2009) interoperability points to three main themes: cyber-infrastructure, ontologies and knowledge management, and the need to work within a semantic and cultural diversity. For the author, these issues represent the structures and tools that will be needed to ensure the required trust and innovation, as well as equitable treatment within the diversity of these inter- and intra-governmental relations.

Finally, Cepal (ibid.), when referring to the technological infrastructure necessary for interoperability, emphasizes that it should only function as an element that facilitates the mobilization and access to information, but its function should not be to store or process this information, thus seeking to respect the autonomy of the integrated parties.

Through this brief review we can begin to understand what is meant by interoperability, what are its main components, as well as the fact that there are different types of interoperability, all necessary to ensure proper, harmonious and efficient operation. Also, that the challenges are varied and emanate, in large part, from the fact that we are talking about relationships between entities with their own structures, collective functioning and work culture. Despite all its complexities, reality has shown that it is a process that has brought and will continue to bring numerous benefits, such as allowing cooperation between different agencies and levels of government regardless of their level of technological development; and, above all, a simplification of administrative activity and processes, resulting in greater efficiency in the work of public administrations (Criado et al. 2010).

For all the above reasons, interoperability is a reality "for the long run" in different regions of the world; and Latin America will be no exception. Or, as Cepal states it very clearly: *Numerous political leaders in Latin America and the Caribbean have already discovered that their nations will not progress without a serious e-government effort. They need to understand now that*

there is no e-government without interoperability and no interoperability without political will' (Cepal, 2007:12).

We will now look at how this political will has been understood and put in practice in the Colombian government in recent years in order to materialize the Lands Node project, where, to date, 12 government entities are converging to share information based on the application of the land restitution public policy.

III. LANDS NODE PROJECT

The Special Administrative Unit for the Restitution of Stripped and Forcibly Abandoned Lands - LRU-, created by Bill 1448 of 2011, is an entity whose main objective is to serve as the administrative body of the National Government for the restitution of land to those dispossessed by the internal armed conflict. This is, to be the entity in charge of receiving the requests for land restitution throughout the country and, after carrying out a detailed study of them, to decide whether to take them to court so that the restitution judges or magistrates can finally decide whether these requests are worthy of land restitution, with the complementary measures that they decide in each case.

To this end, it uses an instrument created by the law called the Registry of Stripped and/or Forced Abandoned Lands; a registry that serves as a filter through which the LRU decides whether or not the application enters the restitution process. In this register, in addition to the property, the persons subject to restitution -the claimants-, their legal relationship with the requested property and that of their family nucleus are registered. To this end, in its Article 76 this law states that public entities must provide information in real time to the LRU in order to advance the process. This is done with the ultimate purpose of ensuring that it is not the victim applicants who must bear the burden of gathering all the required information, but rather that the LRU, with the connivance of the State entities, is the entity in charge of gathering such information, which will become part of the evidence in each case.

According to the main promoter of the Node project, the Information Technology Office of the LRU - hereinafter ITO-, at the time it was not possible to fully comply with the administrative stage of the restitution procedure established by law, 60 days, since the necessary information was not available from the competent entities in due time, which caused delays in the restoration of victims' rights, to the detriment of compliance with the main mandate of Bill 1448 (LRU, 2017). Now, given that this law established a 10-year period for its implementation -from 2011 to 2021-, the obstacles to advancing restitution-in this case, the information access barriers-were putting at risk the possibility of repairing and reinstating the victims, guaranteeing their true rights as land owners.

According to the ITO itself, as established by law, the LRU must:

'(...) prove a person's link to their land, identify and individualize the property and collect evidence of dispossession in the context of the armed conflict (...) culminating in an administrative decision supporting the investigation, terms that are difficult to comply without automatic interoperability between entities' (URT, 2017. P: 2).

In the first years of the law's implementation, the estimated time for the reception of official documents, necessary to advance the evidentiary stage, could be up to 120 days in relation to information regarding the location of the property, and up to 80 days in relation to information on the identification of potential restitution beneficiaries. In general, through official channels -by means of ordinary correspondence or database crossings-, any document requested could take between 20 and 25 days on average to be received. These times could even increase in some regions of the country, such as the offices in Medellín and Pasto, with maximum times of 100 and 120 days in the reception of any information sent by external entities (LRU, 2017).

IV. LANDS NODE STRUCTURING

Once the problem described above was identified, in 2014 the Lands Node project was agreed, structured, and set up with the direct participation of the main institutions with competence in the restitution process. Its main objective: to constitute a virtual platform to advance, in real time, in the exchange of information produced by these entities. Thus, this project was promoted to implement automatic information exchange services between entities, according to the needs of the land restitution process in its administrative and judicial stages -when specialized justice studies the cases-; and post-judgment-moment after the ruling is issued that seeks compliance with the orders contained in it-, in order to: *'(...) reduce the time of the restitution process in general'* (LRU, 2017: 16). Based on the reviewed literature, this case is an applied exercise of horizontal interoperability, understood as that which is developed between different administrations within the same level of government (Criado et al. 2010). This is how the Unit's officials defined and understood the project at its beginning:

'To solve the problems associated with interoperability through electronic means that allow the automation of services, it was necessary to identify the technological maturity of each institution, as well as the state of availability of data, the available resources, the mobilization of cooperators to finance specific developments in the institutions and a permanent technical dialogue to promote the overcoming of the difficulties encountered'

(Application for the DAFP Senior Management Award, 2018: 16).

From the beginning, the project was designed using an integration and orchestration logic, understood as the definition of data validation rules, service access security, execution time management, the management of a certain number of calls to the services of each entity, reliability in the call and consumption of services of each entity and, in general, a series of guidelines supported and defined in the interoperability specifications of the Ministry of Information Technology and Communications¹ (hereinafter, Min Tic).

To begin with, in each of the entities an information and services provided survey was made, as well as an analysis of the pre-existing architecture. Based on this identification, a proposal was formulated to make feasible the interoperability of these services. Parallel to this process, and in order to provide a solution to the legal requirements needed to make an inter-administrative project of these characteristics viable, a series of inter-administrative agreements were managed and signed with the entities that had the information required for the restitution process and would, therefore, be part of the project. As recognized by the LRU at the time, it is important to note that without the signing of these agreements, which sought to determine the form of exchange, the type of information to be exchanged and provided for express confidentiality and data protection clauses, it would not have been legally possible to continue with this project of exchange between State entities (LRU, 2015). This is in line with one of Cepal's recommendations (2007) regarding national interoperability and its necessary legal and regulatory support.

In concrete terms, the methodology for the operation of the Node relies on the fact that each of the 12 entities that are part of it and that access the data of another entity must adopt the methodology written in a guide specifically designed for this project. With this in mind, the aim is to standardize the supply of information. At the same time, new organizational structures were created within each entity to support the provision of these automated services. Finally, the entities that receive the information deployed in the Node must develop new methods of integrating this information (Application for the DAFP Senior Management Award, 2018: 7).

As was defined by common agreement by the entities that participated in the first Technical Committee of the Lands Node -others would eventually join,

¹ These specifications are within the concept of self-sustaining interoperability understood by Min Tic as: *'(...) that service that provides the necessary capabilities to State entities to exchange, integrate and/or share information with other public entities within the framework of their processes, which will facilitate the integration of procedures and services, facilitating the exchange, publication and consumption of information services'* (LRU, 2017: 12).

according to the identified needs-, five basic points ensured proper coordination and articulation among the entities:

1. To have permanent technical links (legal, functional, and responsible for information systems), for the development of interoperability, within the framework of the land restitution process.
2. To participate in the meetings scheduled between the entities responsible for the Lands Node and in the technical meetings programmed for its development, and to comply with the commitments resulting from them.
3. To offer to the professionals in charge of the development of the Lands Node, the necessary information to advance in the information services that will make part of the project.
4. To comply with the established times for the development of the products and the agreed and approved schedule.
5. Once the Node is in operation, to maintain the services that correspond to the entity, according to their legal responsibilities. (Committee Minutes of the first Lands Node Technical Committee, 2015: 4).

Therefore, the Lands Node provided a service, an inter-administrative platform called information bus, in which all these entities could upload their information according to initially defined requirements. In sum, since 2014 this experience has been implemented with the identification, design, and development of interoperability services. In 2017, the installation of the interoperability platform began, and since May 2018 more than 128,000 transactions have been consumed for the restitution process. It was established that this experience should continue until the end of the restitution policy in 2021 (Application for the DAFP Senior Management Award, 2018).

At this step it is important to take a pause to analyze the privacy measures around the information shared in the Node. According to Bill 1448, information provided by victims of dispossession or abandonment of land must be reserved. Consequently, the data transiting through this platform could not be open to the public or to society in general but could only be used for consultation by officials authorized for that purpose. This was established from the beginning of the project and it continues to operate this way.

Regarding the control of the information provided through the Node, it should be noted that each transaction is audited in such a way as to identify who is consulting the data, at what time and for what purpose, among other information displayed for control purposes (Application for the DAFP Senior Management Award, 2018). According to Criado et al. (2010) it is essential to guarantee the confidentiality and traceability of data, so it is important to provide security systems to these platforms so the entities could be able to take part in this

interoperability exercise. The above is a clear example of this.

Another aspect to highlight has been the support and accompaniment by MinTic throughout the process. According to the LRU, this ministry has supported the experience since the first day and has financed the technological platform of interoperability, as well as the integration of three procedures to the Node: Restitution, Repair and Formalization. This ministry, in turn, has been certifying the services provided in the project. No less important, based on the needs presented in "Del Nudo al Nudo de Tierras" (From the Knot to the Lands Node)- a document for the application of funding from the national government-, the Min Tic approved the funding of the business services bus to leverage the entry into production of the interoperability platform (Red Nacional de Información, 2017). This interoperability platform defined in the Project aims to *implement an Enterprise Service Bus (ESB) and its corresponding infrastructure in a Tier (3) data center that integrates, orchestrates and operates the information exchange services between the Special Administrative Unit for the Management of Stripped Land Restitution (UAEGRTD) and the institutions with competence in the process of land restitution in its three administrative, judicial and post-judicial stages'* (ibid.: 4).

In general terms, the Lands Node project has had the following phases throughout its design, structuring and implementation.

Phase 0 (2012-2013) – *Formulation*. The LRU led the efforts to achieve a concerted formulation of the Lands Node project. One of the main results was the production of a document that obtained support from the directors of the institutions that initially integrated the Node, as well as from MinTic and the international cooperation agencies (USAID and Swiss Cooperation) who were its initial funders.

Phase 1 (2014-2015) – *Identification of services*. A work team was defined and the processes of each of the institutions were modeled according to the restitution process.

Phase 2 (2016 - 2017) – *Development*. A set of 60 services was identified and prioritized for development.

Phase 3 (November 2017 - 2018)- *Implementation*. Through the Program Co. Meta 2018, MinTic has financed the technological platform of interoperability. 48 services from 12 institutions have been offered, and by 2018 more than 128,000 transactions have been carried out, providing evidence for the restitution process (Application for the DAFP Senior Management Award, 2018).

a) *Services and Achievements*

The Lands Node allows the exchange of information through three modules. First, the security

module that seeks to ensure that each message is transported from one entity to the other in a secure manner. Within this module the entity that seeks to consume information from the Node must request authorization from the entity that exposes its information. On the other hand, it has an audit module which keeps a record of each message transported through the platform, such as the origin address, destination address, date and time of the query and data contained in the message. Finally, there is the service quality module, whose function is to guarantee that the quality of the information exposed by the entities through this platform is maintained (Red Nacional de Información, 2018).

It is important to stress that each entity member of the Lands Node manages its own information services, so each of them has the possibility to register their services so that the interoperability platform designed for this project can replicate their data regardless of the infrastructure that supports each entity. For this purpose, the project uses a specific software to reduce the risks of compatibility between the technological platforms used by each entity (LRU, 2017).

It is also relevant to specify that the services of the Lands Node start from the Registration System of Stripped and Forced Abandoned Lands, which is the main tool that supports within the LRU the administrative process (LRU's main mission). In addition, the information contained in this registry allows it to interact with the judicial branch, which facilitates monitoring actions after the decision of the judges or restitution magistrates - what is known as the post judicial decision stage.

An essential aspect to understand the usefulness of this tool is what the LRU calls "Data Virtualization" understood as the agility in the access to information, which facilitates the data access from the entities in a unified, simplified and integrated way -in real time or close to real time. *‘Data virtualization integrates data from disparate entity sources and formats, without replicating the data, to build a virtual data layer that facilitates the provision of interoperable services with unified data to support multiple information consumers’* (LRU, 2017: 13). The result is faster access to all data, less replication, greater agility amid change and progress in building an optimal information management strategy (ibid.).

The main achievement of this has been a faster process, as reflected in the fact that, thanks to the Lands Node, officials involved in the land restitution process can obtain information in real time (10 seconds per response). As of 2018 almost 50 interoperability services took place; services that, in the near future, are expected to be applicable to other procedures, for example: formalization of property, cadastre-registration interrelationship, and reparations for victims, among

others (Application for the DAFP High Management Award, 2018).

It must be added also the economic benefits, measured in the resources saved in the request and reception of information (\$5,700 Colombian pesos- corresponding to just over 1.3 euros-, for each document required); and the positive benefits for the environment, due to the savings in the considerable volume of printed documents among the entities that need the information; documents now accessible through this interoperability platform (LRU, 2017).

In addition, other entities are already benefiting from the tools provided by the Node. To date, the VIVANTO information system (used by the Victims' Unit) has been adapted so that, from this system, information related to the Registry of Stripped Lands can be accessed, which has allowed officials of the Victims' Unit to identify whether a victim is registered in the LRU database without having to request the information. Also, the judicial Post Ruling module is allowing the judiciary administrative branch (Consejo Superior de la Judicatura) to follow up on compliance with the restitution policy regarding the enforcement of restitution rulings issued by judges and magistrates (Application for the DAFP High Management Award, 2018).

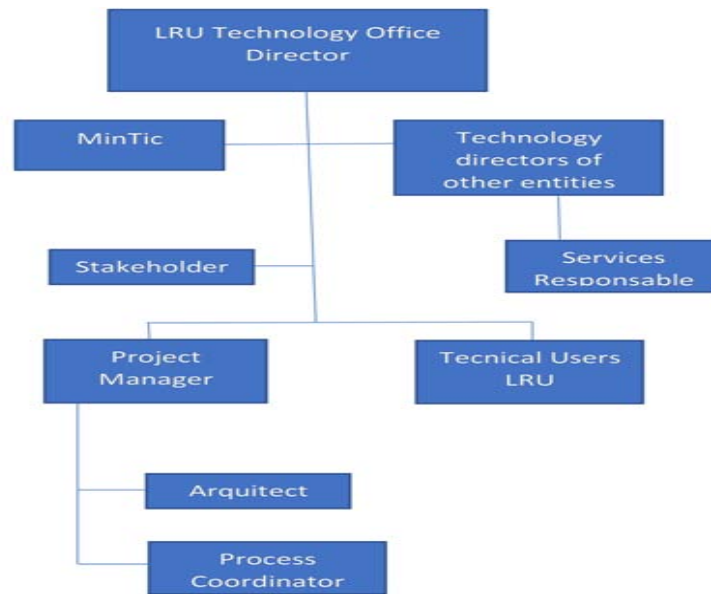
b) *Resources and Challenges*

For the design and implementation of this platform of interoperability between state entities, it was first necessary to have the support of U.S. government cooperation through USAID and, later, the cooperation of MinTic through the program "Co. 2018" as a means to promote technological initiatives. For the purposes of the transactions related to the restitution process, the LRU has been reserving its own resources in order to guarantee the continuity of the interoperability bus. However, now that these two sources have been finalized, the main challenge for the Lands Node is to maintain an investment that will allow it to continue its operations: and not only by the LRU. This was the understanding of Luis Alberto Clavijo, former head of the Information Technology Office of the entity and head coordinator of the project, who has pointed out that the maintenance, administration and disposition of the services is a matter under the responsibility of each institution, since, without it, there is no project that can sustain that operation. In his words:

‘(...) it is necessary that the institutions formally start the next stage, which is the sustainability of the project, generating the corresponding actions in terms of human-technical resources that support and maintain the stability of the services, as well as the allocation of budgetary resources for future contracts of the interoperability service in order to automate or rationalize their mission procedures, taking advantage of the existing experience and infrastructure’ (Red Nacional de Información, 2018:17).

The LRU has committed that, from now on, in each fiscal period it will get the necessary funds from the resources of the national budget, to maintain the interoperability of its information exchange services through this project (ibid.). However, the challenge is to achieve the same commitment from the other entities participating in the Node. This is in line with what was expressed by Lee and Hoon Kwak (2012) for whom the assignment of staff for specific activities is necessary to ensure continuous monitoring and maintenance of this type of system, so agencies should not take these issues lightly, ensuring the availability of resources in their government plans.

There is also a challenge of organizational character. Currently, the Lands Node has an organizational structure, defined since the project was launched, which has allowed it to organize its work and carry out a periodic follow-up based on the functions of each agent working in it. This, according to Luna Reyes (2017), for whom choosing an architecture helps to define the way these tools are built, how the components and services will be developed, and how they will be able to interact with all the other information systems that will be part of these platforms. The following graph illustrates the internal organization of the Node:



Source: Red Nacional de Información (2017)

Graph: Project's Organization Structure

As it can be seen, the project has a coordinating head that also gives guidelines with direct support from MinTic managers, together with those responsible for the technology area and the service area of each participating entity. There is also a stakeholder, which varies according to the phase and specific needs of the project, and below is the manager -in charge of operations-, a series of technical users of the LRU who process and consume the information according to their needs, and below is the architect of the platform, together with the person who coordinates the different processes that are part of the Node and the information that is recorded from each of them.

It is worth noting that until the first months of 2019 this architecture worked, obviously with its ups and downs typical of any collaborative process. However, now with a new head of the LRU's information technology area, added to new heads of these areas in the other entities that are part of the Node, there is a growing concern that this level of coordination will be maintained, with the necessary follow-up committees and specific meetings that this implies. In sum, the

administrative-organizational challenge is to achieve the same level of commitment and work of the teams that structured and started implementing the Node. All this, by new human resources that must ensure that the project continues to flow. This is not only related to the person in charge of the technology area of the LRU, but also to the other people in charge of the other entities and the new officials that are part of the Ministry of Information Technology and Communications-MinTic.

V. CONCLUSIONS

The Lands Node is a clear interoperability project of the Colombian government. It meets all the characteristics noted in the specialized literature: use of 2.0 technology, information exchange, inter-institutional coordination, regulatory compliance, allocated resources, monitoring and defined objectives, among others. The challenges involved in this project are also in line with those pointed out by the academy: availability of economic and human resources, together with a permanent monitoring exercise under a defined structure. To date, the Node is already beginning to

yield more than interesting results in terms of time and resources savings, in compliance with the time frames established in the land restitution public policy.

It has been a huge challenge in terms of time and resources, and without the support of external entities - through international cooperation at first and then with the support of MinTic - the Lands Node would not have been a reality. Nor without the leadership of the Information Technology area of the LRU, the main beneficiary of the project, and the concurrence of its counterparts from the different participating entities. As mentioned above, the challenge is to maintain this momentum and coordination between entities, coupled with the necessary investment in resources needed for the platform to continue operating. Notwithstanding the latter-which should not be neglected-, this project has been an example to be shown by the previous government (during which it was born and started operations). Proof of this is that at last year's Node Committee meeting, it was pointed out that the National Information Network Systems Subcommittee had been discussing the possibility of building other nodes for different sectors -victims, health, education, among others-, that would use the experience of this project and the services already designed for its operation; new projects that would seek, as the Lands Node has sought, to speed up institutional procedures through virtual coordination with the different government sectors (Red Nacional de Información, 2018).

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Cloud Computing and Performance of County Governments in Kenya; A Case of the County Government of Nyandarua

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Abstract- The general objective of the study was to investigate the effect of cloud computing on the performance of county governments in Kenya; a case of the county government of Nyandarua. The study's specific objectives were to establish the influence of staff skills on performance of the County Government. The study was informed by Resource Based View Theory. The study adopted a correlational research design. The target population was 130 employees in ICT, communication, finance and administration department in the county government of Nyandarua. Simple random sampling was used to select a sample size of 97 respondents. The collected data was analyzed using multiple regression, descriptive statistics and correlation analysis. The findings revealed that staff skills had no influence on the performance of the county government. The study recommended for county governments to have adequate software and hardware for easy utilization of cloud computing technologies.

Keywords: *cloud computing, performance, staff skills.*

GJMBR-G Classification: *JEL Code: L25*



Strictly as per the compliance and regulations of:



Cloud Computing and Performance of County Governments in Kenya; A Case of the County Government of Nyandarua

Wangui Aurelia Wanjiru ^α & Dr. Muchelule Yusuf ^σ

Abstract- The general objective of the study was to investigate the effect of cloud computing on the performance of county governments in Kenya; a case of the county government of Nyandarua. The study's specific objectives were to establish the influence of staff skills on performance of the County Government. The study was informed by Resource Based View Theory. The study adopted a correlational research design. The target population was 130 employees in ICT, communication, finance and administration department in the county government of Nyandarua. Simple random sampling was used to select a sample size of 97 respondents. The collected data was analyzed using multiple regression, descriptive statistics and correlation analysis. The findings revealed that staff skills had no influence on the performance of the county government. The study recommended for county governments to have adequate software and hardware for easy utilization of cloud computing technologies.

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I. INTRODUCTION

The term cloud computing is a concept stemmed from distributed and grid computing. Cloud computing is explained as the derivative of distributed and grid computing by certain scholars (Che, Duan, Zhang & Fan, 2018). It entails the aspects and conditions where total computing could be conducted by use of another individual's network where proprietorship of hardware and soft resources are of outside stakeholders. Recently, the cloud has advanced into two wide outlooks– to rent the framework in cloud, or to rent any particular facility in the cloud. Where the former involves the hardware and software operation, the latter is limited to the 'soft' commodities or services from the cloud service and facility providers.

The world of computing has been advanced with various phrasings for instance PaaS (Platform as a Service), IaaS (Infrastructure as a Service) and SaaS (Software as a Service) with its advancement. As previously explored, the name 'cloud computing' is notably a conception, so are the terms to explain several blends of cloud computing. Fundamentally, cloud computing is not but a comprehensive form of distributed and grid computing which deviates with

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respect to services, infrastructure, deployment and geographic dispersion (Hashizume et al. 2017; Westphall et al., 2018; Hamlen, Kantarcioglu, Khan, & Thuraisingham, 2018).

Cloud computing allows organizations to use their hardware and software investments in more efficient ways. This is achieved by overcoming the physical barriers of the isolated systems and automated managing a group of systems as a single unit. This technology is seen as a virtualized system which constitutes a natural evolution of data centres, hence increase performance of organization/institutions (Boss at al., 2017). Cloud computing also leads to lower software costs. Organizations no longer have to buy separate software packages for each computer (Miller, 2019). Instead, a particular application is accessed only by the employees using that application. Moreover, this also means saved cost of installing and maintaining that software on each computer. Another software-related cost benefit is that organizations do not have to pay for a software upgrade in order to have the latest versions of the applications (Miller, 2019). As all applications are in the cloud, they are upgraded automatically by the provider. Organizations can also greatly reduce their maintenance costs (Miller, 2019), this might eventual lead to improved organization performance, however, there is limited literature that links cloud computing and performance of County governments.

a) Statement of the Problem

There is a growing concern regarding performance of county governments in Kenya. According to Transparency International Survey conducted in 2017 on County Governments Performance in Kenya clearly indicated that 41% of the Kenya populations from the 47 were unsatisfied with the performance of their Counties. According to Auditor General Report (2018) over Kshs. 10 billion cannot be accounted for by the county governments. This has slowly led to the deterioration of the county performance affecting even the country's GDP growth index from 7% in 2009 to 5.8% in 2016 (Kihara, 2016).

Information Communication Technology (ICT) is viewed as a key enabler for the achievement of government policies for economic growth and development. Thus, globally, most governments are

adopting various state-of-the art Information Technologies (IT) such as Cloud computing to advance their business operations (Pan and Jang, 2008; Sultan, 2010). However, The ICT policy environment in Kenya remains fragmented and un conducive to creating affordable and good quality high speed broadband access – a necessary, though not sufficient condition for cloud services to be optimized (access Kenya, 2017). The adoption of cloud computing in Kenya is still emerging. A cloud computing in Kenya report indicates that adoption of cloud computing is fairly recent with first adopters appearing in 2010 and showing no benefits or improved on performance (Omwansa, Waema, & Omwenga, 2014). County governments have lagged behind the private sector in strategic deployment of ICT. While the private sector has cautiously adopted the cloud to optimize business, the response from the public sector as a whole has been sluggish and uneven.

Despite the great advantage of cloud computing many research discoveries are in the developed countries (Osterman, 2012; Sharif, 2009; Gartner, 2009; Chan and Chen, 2010) and very few in the developing countries. Kituku (2012) observed that cloud computing is still new to both academia and private sector in Kenya. in addition, Despite the effort of Nyandarua county to integrate services through cloud computing there still facing challenges such as lack of relevant skills, lack of the right support on ICT infrastructure, poor or unenforced ICT policies and failure to understand the utility of cloud computing, Nyandarua County report(2017). Hence this study sought to address the research gaps discussed by analyzing the effect of cloud computing on the performance of the County Government of Nyandarua.

b) Objective

To establish the influence of staff skills on performance of the County Governments in Kenya.

II. LITERATURE REVIEW

a) Theoretical Literature Review

i. Resource Based View Theory (RBV)

The use of the RBV theory in innovation research has grown exponentially in the past decade, which suggests its importance as a framework for explaining and predicting competitive advantage and performance outcomes (Barney *et al.*, 2011; Slotegraaf *et al.*, 2003; Vorhies and Morgan 2005). RBV theory of the firm was introduced by Wernerfelt (1984) and was expounded by Barney (1991) who expresses that firm resources include all assets, capabilities, organizational financials, firm attributes, information, knowledge (innovation capabilities), etc. controlled by a firm and it enables it to conceive and implement strategies that improve its efficiency and effectiveness in terms of performance. Innovation dimensions as a capability has

in recent times been acknowledged by innovation researchers. Consequently, they have adopted RBV as the most appropriate theoretical framework to evaluate firm performance (Keramati *et al.*, 2010; Rapp *et al.*, 2010).

RBV theory which shoots from the principle of the source of firms' competitive advantage (enhanced performance), lies in their internal resources as opposed to their positioning in the external environment. That is, competitive advantage of a firm depends on the unique resources and capabilities it poses rather than merely evaluating environmental opportunities and threats in conducting business. The RBV of the firm predicts that certain resources possessed and organized by the firm for such innovations have the prospective to generate competitive advantage and eventually superior firm performance (Ainuddin *et al.*, 2007). Resources that are valuable, rare, inimitable and non-substitutable allow the firm to do a better job of taking planned actions. If these actions that are taken capitalize resources, it creates a competitive advantage, which in turn enhances performance (Ketchen Jr. *et al.*, 2007).

According to RBV, not only must firms be able to create knowledge within their boundaries, but they must also expose themselves to a bombardment of new ideas from their external environment in order to prevent rigidity, to encourage innovative behavior, and to check their technological developments against those of competitors (Leonard-Barton, 1995). In relevance with this study, from the resource-based view perspective, innovation does not come simply from scanning the external environment for market opportunities, but from looking inside and building on the resource endowment and core competencies of the organization. The RBV literature suggests that a firm should strive to innovate not only better than competitors but also one step ahead of the competition. By developing dynamic capabilities, for example, a firm is able to adapt to changing industry conditions, learn and exploit new knowledge and articulate an innovative response to previously nonexistent market demand (Kim & Kim, 2009).

The resource-based research is important to this study based on the fundamental premise that organizational resources and capabilities are those that underlie and determine a firm's capacity for innovation. Within this perspective, organizational resources (tangible and intangible) are taken to provide the input that in turn is combined and transformed by staff skills and infrastructure to produce management innovative forms of improved firm performance.

b) *Conceptual Framework*

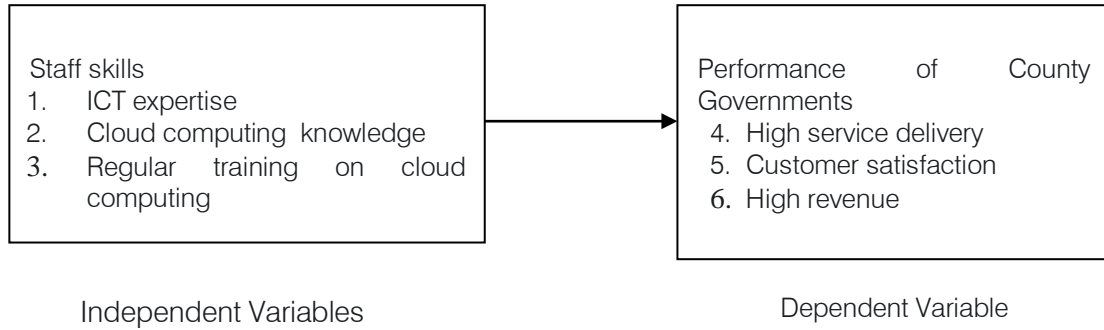


Figure 1: Conceptual Framework

c) *Empirical Review*

i. *Staff Skills and Organisation Performance*

A study conducted by Cragg and Zinatelli (2009) indicated that called attention to that absence of employee capability has truly prevented IT advancement and development inside firms, in this manner, they should beat this issue through either looking for assistance from external sources or building up their own employee ability to utilize new technology (Nieto and Fernández, 2005). External consultants and sellers are the primary sources of external IT skill in regards to IT usage inside small firms (Thong, 2009). Inferable from the significance of external help, these organizations are confronting challenges since IT vendors tend to favor their marketing to bigger firms and fail to comprehend exceptional necessities (Ahuja, Yang and Shankar, 2009).

Sari and Kurniawan (2015) conducted a study on staff skill and implementation of cloud computing. their findings showed that staff skills are important and essential properties to use cloud computing. Further, the maximum crucial utilization of cloud computing dependent on staff skills if they have to be successful in using cloud computing. Staff skills in IT play a vital feature in organizational results, and lots of researchers agree that staff skill is key position in influencing the adoption of innovational things to do inside the businesses (Al shaar, et al., 2015). It staff IT skills provide the understanding and abilities to place into effect cloud-computing-associated it features (Wang et al., 2010).

III. *RESEARCH METHODOLOGY*

The study adopted a correlational research design. The target population were ICT officers within the county government of Nyandarua which included one hundred and thirty (130) employees in ICT, communication, finance and administration department. The sample size of the study was calculated using the formula below as recommended by fisher et al (2003). A sample size of ninety-seven (97) respondents were chosen for the study. The study employed purposive

sampling to select respondents while simple random sampling was used to select section heads and middle level employees based at the departmental level. Simple random sampling was used to avoid biasness and every individual had an equal chance to participate in the study.

Primary data for the study was collected with questionnaires. Data obtained from the field was coded, cleaned, and entered into the computer for analysis using the Statistical Package for Social Sciences (SPSS version 24). Descriptive statistical procedures including cross-tabulations and frequency distributions were used to provide comparisons and contrasts between cloud computing and performance of county governments. Inferential statistical analysis was also used. The collected data was analyzed using multiple regression and correlation analysis, and the significance of each independent variable was tested at a confidence level of 95%.

IV. *RESEARCH FINDINGS*

a) *Descriptive Statistics*

i. *Descriptive Statistics for Staff Skills*

Staff skills can be defined as the technical understanding and subject knowledge that enable employees to carry out their role to the best of their ability. Thus, the study sought to establish the perspective of the employees regarding the effect of staff skills on performance of the County Government of Nyandarua. Their views were measured on a 5- point Likert scale to determine their degree of agreement or disagreement with the various statements regarding staff skills. The findings were presented in Table 1.

From the findings, 46 (58.2%) and 10 (12.7%) of the employees of Nyandarua County government agree and strongly agree respectively that the county engages IT experts in conducting regular system upgrades and updates while 12 (15.2%) and 11 (13.9%) disagree or are not sure of this. The mean response is 3.68 (SD = 0.885). Furthermore, the findings show that 54 (68.4%) and 19 (24.1%) of the employees agree and strongly agree respectively that the county emphasis is on

employing employees with cloud computing technologies skills while 3 (3.8%) disagree and were not sure of this respectively giving a mean response of 4.13 (SD = 0.648).

The findings further show that 48 (60.8%) and 10 (12.7%) of the employees agree and strongly agree respectively that the county regularly trains on how they can better incorporate cloud computing in their day to day work while 5 (6.3%) and 16 (20.3%) disagree and are not sure of this respectively. The mean response was 3.46 (SD = 1.01) indicating overall neutrality with the aspect of regular training on how to incorporate cloud computing in their daily work.

In addition, the findings show that 48 (60.8%) and 10 (12.7%) of the employees agree and strongly agree respectively that knowledge of cloud computing is a key factor in the selection of employees or volunteers for the organization while 5 (6.3%) and 16 (20.3%) disagree and are not sure of this respectively. The mean response was 3.80 (SD = 0.740) meaning knowledge of cloud computing is a key factor in the selection of employees or volunteers. Further, the findings show that 37 (46.8%) and 13 (16.5%) of the employees agree and strongly agree respectively that the county provides time and resources for training cloud computing for those directly involved in projects while 9 (11.4%) and 20 (25.3%) disagree and hold a neutral view on this respectively. The mean response was 3.68 (SD = 0.885).

Finally, 10 (12.7%) and 46 (58.2%) of the employees agreed and strongly agreed respectively that emphasis is laid on training in cloud computing after new employee hiring while 11 (13.9%) were neutral and 12 (15.2%) disagreed. The overall mean for the item is 4.13 (SD = 0.648). The overall mean response for staff skills was 3.79 (SD = 0.384) indicating overall agreement by majority of the employees regarding aspects of staff skills. Assessment of the standard deviations show that all of them are within the +/-1.96 range which is the approximate value of the 95-percentile point of the normal distribution.

ii. Descriptive Statistics for Performance of County Governments

The study sought to establish the views of the employees on the performance of Nyandarua county government especially given the perceived level of staff skills, ICT infrastructure, ICT policy and Perceived value. Their views were measured using a 5- point Likert scale to indicate their degree of agreement or disagreement with various aspects that define Performance of County Governments and the findings were presented in Table 2.

The findings in Table 2 show that 30 (38%) and 4 (5.1%) agree and strongly agree respectively that there is a general improvement of services in county

governments whereas 15 (19%), 13 (16.5%) and 17 (21.5%) strongly disagreed, disagreed and held a neutral view respectively. The mean response was 2.94 (SD = 1.234) that showed neutrality in terms of general improvement of services in county governments.

Furthermore, 39 (49.4%) and 14 (17.7%) of the employees agree and strongly agree respectively that revenue collection and accounting functions is more efficient in county government whereas 8 (10.1%), 14 (17.7%) and 4 (5.1%) of the employees strongly disagree, disagree and hold a neutral view regarding service levels of the suppliers and giving a mean response of 3.47 (SD = 1.259). The findings also show that 28 (35.4%) and 14 (7.7%) of the employees agree and strongly agree respectively that there is high level of customer/citizen satisfaction with county services while 10 (12.7%), 17 (21.5%) and 10 (12.7%) indicated otherwise giving a mean response of 3.24 (SD = 1.323).

Furthermore, 33 (41.8%) and 13 (16.5%) of the employees agree and strongly agree respectively that trading services and licensing has significantly improved while 15 (19%), 13 (16.5%) and 5 (6.3%) of the employees indicated otherwise with a mean response of 3.20 (SD = 1.409). In addition, 22 (27.8%) and 20 (25.3%) of the employees agree and strongly agree respectively that the health services have improved in services delivery while 6 (7.6%), 17 (21.5%) and 14 (17.7%) indicated otherwise respectively resulting a mean response of 3.42 (SD = 1.287).

Finally, the findings show that 39 (49.4%) and 9 (11.4%) of the employees agree and strongly agree respectively that improved county governance terms of accountability, transparency and accessibility of services while 5 (6.3%), 8 (10.1%) and 18 (22.8%) of the employees indicated otherwise respectively giving a mean response of 3.49 (SD = 1.036). Generally, the mean response regarding Performance of County Governments was 3.29 (SD = 0.780) indicating that the county government of Nyandarua is yet to realize improved performance from the use of cloud computing.

b) Inferential statistics

i. Correlation Results

Thus, the study sought to establish the nature of the relationships existing between the independent variables and the dependent variable by examining the correlation coefficients. Consequently, a correlation analysis of the independent factors and the dependent factor (performance of county government) was conducted and the findings were summarized and presented in Table 3.

The findings in Table 3 show that staff skills has a positive and significant relationship with Performance of County Governments, $\rho = 0.712$, $\rho < 0.001$. This means that there is a probability of 0.712 that

Performance of Nyandarua county government would increase given an increase in staff skills.

ii. *Regression model*

The regression analysis in this case is used in assess the effect of the independent factors on the dependent factor (Performance of Nyandarua County Government) and answer the underlying research questions. First the model summary and the analysis of variance which is used in assessing model fit were assessed and findings were presented in Table 4 and Table 5. The regression analysis findings are used in answering the research questions for the study.

The findings in Table 4 on the model summary show that all the predictors explain 68.2% of the variation in Performance of Nyandarua county governments ($R = 0.826$, R -squared = 0.682, Adjusted R -squared = 0.664). The coefficient of determination explains the extent to which changes in the response variable can be explained by the change in the explanatory variables or the percentage of variation in the dependent variable that is explained by all the independent variable.

ANOVA results in Table 5 show that the model fit was good as illustrated by overall test of significance with $F(4, 74)$ value of 39.607 with $p < 0.001$. Thus, the model was fit to predict the performance of Nyandarua county governments based on effect of cloud computing.

The specific objective of this study was to investigate the influence of staff skills on performance of the County Government of Nyandarua. As such, the study sought to answer the following research question: What is the influence of staff skills on the performance of the County Government of Nyandarua? The findings in Table 6 show that staff skills do not influence the performance of Nyandarua county government, $\beta_1 = 0.147$, $p = 0.188$. This shows that staff skill were not important is using cloud computing for county performance. The findings are contrary to Sari and Kurniawan (2015) argument that that staff skills are important and essential properties to use cloud computing. Similarly, the findings disagrees with Al shaar, et al., (2015) that the maximum crucial utilization of cloud computing dependent on staff skills if they have to be successful in using cloud computing. It staff IT skills provide the understanding and abilities to place into effect cloud-computing-associated it features (Wang et al., 2010).

V. CONCLUSIONS

In conclusion, the study found that staff skills had no influence on the performance of Nyandarua county government. The findings imply that despite the county government's focus on computer skills acquisition among the employees and engaging IT experts in conducting regular system upgrades and

updates, it was not enough to elicit an improvement in the county's performance. It could be that the staff are not better equipped to utilize cloud computing in enhancing the county's performance. As such, there is need for further studies on the same to ascertain if indeed staff skills have no influence on county's performance in the context of cloud computing.

IV. RECOMMENDATIONS

Owing to the findings of the study, ICT infrastructure is instrumental in improving the performance of the county government. As such, it is recommended for county governments to have adequate software and hardware for easy utilization of cloud computing technologies. Besides that, it is important for the county to have fast, reliable and efficient internet connectivity for cloud computing usage. In addition, the country government should set aside a budget for purchasing new computer devices. Consequently, adequate and appropriate ICT infrastructure is likely to bring about an in improvement in the performance of the county government.

a) *Areas for Further Studies*

On a geographical dimension, this study was primarily limited to Nyandarua county government. Therefore, it may not be appropriate to generalize to the whole population of counties in this country or any other country. For this reason, further empirical investigations in different regions and countries are needed.

Furthermore, the methodology that has been chosen to achieve the research objectives was limited to questionnaires. As such, future research could build on this study by examining effect of cloud computing in different sectors and industries in both a qualitative and quantitative way. Future studies could use the same basic hypotheses, but implement the study in terms of a longitudinal rather than a cross-sectional design. Finally, only a single research methodological approach was employed and future research through interviews could be undertaken to triangulate.

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APPENDICES

Table 1: Descriptive Statistics for Staff Skills

		SD	D	N	A	SA	Mean	SD
The county engage IT experts in conducting regular system upgrades and updates	n	0	12	11	46	10	3.68	0.885
	%	0	15.2	13.9	58.2	12.7		
The county emphasis on employing employees with cloud computing technologies	n	0	3	3	54	19	4.13	0.648
	%	0	3.8	3.8	68.4	24.1		
The county regularly trains on how they can better incorporate cloud computing in my day to day work	n	0	5	16	48	10	3.46	1.010
	%	0	6.3	20.3	60.8	12.7		
Knowledge of cloud computing is a key factor in the selection of employees or volunteers for your organization	n	0	5	16	48	10	3.80	0.740
	%	0	6.3	20.3	60.8	12.7		
The county provides time and resources for training cloud computing for those directly involved in projects.	n	0	9	20	37	13	3.68	0.885
	%	0	11.4	25.3	46.8	16.5		
After new employees hiring, emphasis is laid on training in cloud computing.	%	0	15.2	13.9	58.2	12.7		
	n	0	12	11	46	10	4.13	0.648
Staff skills							3.79	0.384

Table 2: Descriptive Statistics for Performance of County Governments

		SD	D	N	A	SA	Mean	SD
There is a general improvement of services in county governments	N	15	13	17	30	4	2.94	1.234
	%	19	16.5	21.5	38	5.1		
Revenue collection and accounting functions is more efficient in county government	N	8	14	4	39	14	3.47	1.259
	%	10.1	17.7	5.1	49.4	17.7		
There is high level of customer/citizen satisfaction with county services	N	10	17	10	28	14	3.24	1.323
	%	12.7	21.5	12.7	35.4	17.7		
Trading services and licensing has significantly improved	N	15	13	5	33	13	3.20	1.409
	%	19	16.5	6.3	41.8	16.5		
The health services have improved in services delivery	N	6	17	14	22	20	3.42	1.287
	%	7.6	21.5	17.7	27.8	25.3		
Improved county governance terms of accountability, transparency and accessibility of services	N	5	8	18	39	9	3.49	1.036
	%	6.3	10.1	22.8	49.4	11.4		
Performance of County Governments							3.29	0.78

Table 3: Correlation Analysis

		Performance of County Governments	Staff skills
Performance of County Governments	P	1	
	p-value	0	
Staff skills	P	.712**	1
	p-value	0.000	
	p-value	0.000	0.000

** Correlation is significant at the 0.01 level (2-tailed).
 ρ is the Pearson's Product Moment Correlation Coefficient

Table 4: Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.826a	0.682	0.664	0.458

a Predictors: (Constant), Perceived value, ICT infrastructure, Staff skills, ICT policy

Table 5: Analysis of Variance (ANOVA)

	Sum of Squares	Df	Mean Square	F	Sig.
Regression	33.2	4	8.3	39.607	0.000b
Residual	15.507	74	0.21		
Total	48.707	78			

a Dependent Variable: Performance of County Governments

b Predictors: (Constant), Perceived value, ICT infrastructure, Staff skills, ICT policy

Table 6: Regression model

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	0.639	0.263		2.430	0.018
Staff skills	0.126	0.095	0.147	1.328	0.188

a Dependent Variable: Performance of Nyandarua county government





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GJMBR-G Classification: JEL Code: C13, D74, H1, N4, O17, O18



PEACE BUILDING IN COLOMBIA REGIONAL IMPACTS ON SECURITY OF THE NATIONAL POLICY FOR TERRITORIAL CONSOLIDATION AND RECONSTRUCTION

Strictly as per the compliance and regulations of:



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I. INTRODUCTION

Colombia is a very diverse country in terms of climate, geography, institutions and culture. Besides, it's a country that has been built from specific realities at the regional level (Chernick, 1999). The way the territory was both settled and politically consolidated since the colony period does not allow any generalisation at any level. In the words of Geertz, "The state-nation in Colombia has been "a social instrument made to respond to unequal identities, unclear wishes and acknowledgements that compete among themselves". (Geertz, taken from González pp. 25). Colombia is a country of regions (González, Bolívar, and Vásquez 2003)

Several rigorous studies agree that one of the main causes of persisting armed conflict in a country is the concept of a weak or failed state, or even a non-existent one (Jackson, Quasi-States; Bayart, State in Africa; Zartman, Collapsed States Besley and Torsten, State Capacity, Acemoglu, Ticchi, Vindigni, Emergence States). The Colombian state has indeed an uneven government presence in all regions; unfortunately, this has provided an opening for insurgent groups to be "able to resist the central government's attempts to supposed modernization", to control local areas neglected by government institutions and to disconnect them from national markets (González, 2014) and the provision of security (Bulla y Guarín, 2015). There is no doubt that due to decades of systematic internal conflict and to the evolution of armed opponents at the local

level, the Colombian state has been sharing his governance in a coacted, parallel or contested way (Duarte, 2016, González, 2014, Bates, 2001).

Indeed, González (2014) pointed out that the main cause of the internal armed conflict in Colombia for more than five decades together with its devastating effects in terms of human lives and damage to economical infrastructure is the consequence of an uneven presence of the state in all regions. With in this context, Duarte (2016) also claimed that the uneven presence of the Colombian state is associated with the concentration of power in each region. Therefore, the state governance capacity or its absence in some regions versus armed opponents, that have limited their governance in a contested way, would be the main cause of the conflict. To this point, Duarte acknowledges the existence of a state that has adapted itself to each region or even the existence of a parallel state in different areas of Colombia.

Alves (2000) and Jackson (1990) state that the conflict can not be perpetuated where there is a weak presence of the state, which is a statement that goes together with what some authors have defined as a failed state. (Acemoglu, Ticchi, Vindigni, 2011); In any case, it has been pointed out that Colombia is a state that has gone through an ongoing consolidation process; a poor state that has been incapable of imposing itself and facing insurgent groups that submit the territory.

Yet, in this regard, some authors share different opinions. Some of them ensure that the unequal presence of the state in regions is due to the convenience of the government in power that pursue economical benefits and take advantage of the lack of regulation and solid institutions; in this case, the state would act as an accomplice. (Barham y Kleinfeld, 2018). Evidence of this is seen in the way self-defence groups became paramilitary groups in some regions of the country; in addition to challenging the guerrillas, to decrease land prices for their benefit, they used violence against civilians, which was endorsed by the military (Barham and Kleinfeld, 2018).

Whether they were weak, complicit, or still developing, it is safe to say that the various Colombian governments have never had complete control of the country, which created 'possibility conditions'ⁱ for

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various opponents of the government to reorganize, exercise local authority, and create conflict in these regions.

Given that state-building depends on peacekeeping (Böge, et al., 2008), it becomes urgent to provide the most affected regions with the proper tools. For this reason, various administrations have negotiated peace agreements with different armed groups at different times during the conflict. Also, they have implemented plans and policies to strengthen state institutions in the regions (López, 2016). In fact, it must be recognized that state capacity has improved in recent decades and, although little, the legitimacy of government institutions has gained space in the territories. (BarreraOsorio, Maldonado, and Rodríguez 2012).

Despite the above, in Colombia, different groups have made the bet of consolidating the state institutions in the regions of conflict; indeed, they have worked for the pacification of the territory together with the re-establishment of security and its eventual economical and social ascent. To this respect, López (2016) notes that there have been at least ten peace plans in Colombia that started during the term of ex-president Lleras, (1958-1962) and recently drove to the peace agreement with guerrillas of the Revolutionary Armed Forces of Colombia, FARC-EP in 2016, during the term of ex-president Santos.

In this framework, this research contributes to the literature of state-building by evaluating the impact of the interventions carried out by the *National Policy for territorial consolidation and reconstruction* (PNCRT) implemented in conflict regions during the term of Juan Manuel Santos (2010-2014). This policy brought together more than 30 years of government effort through trial and error to establish peace in the regions. It happened at a critical time of internal conflict while negotiations with the guerrillas of the Revolutionary Armed Forces of Colombia – People’s Army (*Fuerzas Armadas Revolucionarias- Ejército del Pueblo - FARC-EP*) and the National Liberation Army (*Ejército de Liberación Nacional - ELN*) were taking place. Finally, as it was said, the negotiations with FARC-EP reached a successful conclusion in 2016.

It is worth clarifying that this study relies on a definition of the role of the state which legitimises it. (Mann, 1993); that is both, the power to use violence and the possibility of collecting taxes (known as *imperium*). This is the basis for studying the fundamental goal of the PNCRT, in other words, the capacity of rebuilding the regions devastated by decades of violence. Of course, this presumes that establishing peace around the regions in conflict is one of basic preconditions to legitimize the power of the State, specifically with regard to the use of force. Indeed, it is expected that the implementation of a peace policy will ensure progress by making the country safe and

enabling citizens to exercise their civil and economic rights.

Statistical tools such as *Propensity Score Matching* and the *Difference in differences* were applied for this study. The former was used to match municipalities that were treated by the Policy with others that shared identical observable characteristics, but which were not treated by the policy. Once the matching of municipalities was achieved, the effects of the policy were compared with the latter, the *Difference in Differences* technique. Of course, this involved an analysis that took geographical and socioeconomic differences into account.

Thus, this paper not only provided data on how the PNCRT succeeded in re-building peace in regions but also, unlike the existing literature in this area, it brought evidence of the rebuilding of institutional capacity in the regions where conflict has predominated

Last, the remainder of this paper focuses on explaining what the PNCRT is, its origins and its main background. It also describes how this policy was implemented, highlighting the importance of its geographical focus, which constituted the major challenge for its evaluation and justified the use of two econometric techniques. Results are classified in three main areas according to the PNCRT objectives in terms of peace building, mitigating threats to human life and survival, attacks on public and private infrastructure, and the eradication of illicit crops. Lastly, conclusions emphasize both the importance of PNCRT and some remaining issues as a basis for further research.

II. RECENT BACKGROUND TO THE NATIONAL POLICY FOR TERRITORIAL CONSOLIDATION AND RECONSTRUCTION

a) *From Plan Colombia to the Consolidation Policy*

Prior to the PNCRT, the Plan Colombia program stood for peace, prosperity and the state strengthening. It started during the term of ex-president Pastrana (1998-2002) and it was incorporated into the *Democratic Security Policy* during the two terms of ex-president Uribe. Since it was sponsored by the international community, the military force not only increased but was modernised as an offensive strategy against guerrillas. This way, the state presence in the regions evidenced both in the defence policy and in democratic security.

Initially, *Plan Colombia* prioritized the solving of the armed conflict. Thus, the dialogue with guerrilla groups was meant to be the basis of the program. Unfortunately, it didn't succeed because none of the parts showed a real willingness to build peace during the Caguan negotiation in 1999. In fact, while the state carried out the consolidation of counter-insurgency strategies with the help of *Comando Sur* in the state of Florida, guerrillas took advantage of the demilitarized

zone to strengthen their criminal conduct and their militia army.

It's important to note that president Pastrana policy left behind other urgent problems such as an increase in the guerrillas purchasing power emerging from the access of drug trafficking. For this reason, when Alvaro Uribe took office, he highlighted the harmful consequences of illegal drugs that threatened the country's economy and democracy. Indeed, during his two terms, president Uribe focused on two pillars: both, illegal crops and counter-insurgency war.

During the second Uribe term, the Comprehensive Action Doctrine (*Doctrina de Acción Integral – DAI*) was enacted and subsequently led by the Centre for Coordination and Comprehensive Action (*Centro de Coordinación y Acción Integral – CCAI*). This doctrine was designed by Juan Manuel Santos, who was the Minister of Defense at the time. The CCAI was composed of fourteen governmental entities that sought to strengthen the regions that the state gradually recovered by military action.

The Comprehensive Consolidation Program (*Programa de Consolidación Integral (PCI)*) was designed based on the DAI, in 2017 and maintained both, the counter-narcotics and the counter-insurgency character of CCAI. Besides, it had a team on its own and included a regional structure that integrated the regions into national markets.

In 2009, the PCI was integrated into the National Consolidation and Reconstruction Policy. By the end of 2011, ex-president Juan Manuel Santos created the Special Administrative Unit for Territorial Consolidation (UACT) for the purpose to prevent any reversal of the improvements of public security forces in terms of security.

b) *The National Policy for territorial Consolidation and Reconstruction*

The National Policy for Consolidation and Territorial Reconstruction PNCRT came about during the administration of ex-president Santos and was led by the National Security Council. To implement the PNCRT, decree 4161 dated November 3 of 2011, created the Special Administrative Unit for Territorial Consolidation (UACT). This was a legal entity with its assets, national scope, administrative and financial autonomy, that was attached to the Administrative Department for Social Prosperity (*Departamento Administrativo para la Prósperidad Social*), the government entity that leads the Sector of social inclusion and reconciliation.

The UACT is part of this sector, along with the Colombian Family Welfare Institute (*Instituto Colombiano de Bienestar Familiar – ICBF*), the Unit for the Victims Assistance and Reparation (*Unidad para Atención y Reparación a las Víctimas*), the National Agency to Eliminate Extreme Poverty (*Agencia Nacional para la Superación de la Pobreza Extrema*) and the National

Centre for Historical Memory (*Centro Nacional de Memoria Histórica*)ⁱⁱ.

All the previous efforts that the Colombian State had undertaken to consolidate its presence along the national territory were pursued by the PNCRT. Its reason for being was to establish the institutional and legal control over Colombia's regions; to guarantee the protection of citizens exercising their rights as well as to ensure citizen participation and achieve the economical, social and institutional integration of the targeted regions by creating conditions to sustain secure living conditions.

In terms of the conceptual framework of PNCRT, it relies on three major bases consisting of the counterinsurgency doctrine (COIN), anti-drugs policies from *Plan Colombia* and a regional and social development component of the areas where it was implemented. The COIN is a political and military theory built up to help the state facing an asymmetric war against the insurgency that affects both, political and social order.

It's important to note that the PNCRT focused on solving the weak presence of the state in areas that were marginalised by violence. Its main challenge was to maintain security in recovered zones ensuring the irreversibility of the public force improvements in terms of securityⁱⁱⁱ; that would be done by establishing institutions that would pay off debts concerning developmental, institutional, economical and social prosperity at the local level.

III. STRATEGY FOR EVALUATING THE NATIONAL POLICY FOR TERRITORIAL CONSOLIDATION AND RECONSTRUCTION

Once the policy was defined, to implement it, the government needed to define the municipalities where it would startup. These regions were called « Treatment municipalities ». It was also necessary to find out other districts that shared the same characteristics, called the « Control municipalities », whose comparison with the prior would measure the impact of the policy. Last, data was built after defining a design to measure outcome variables and a period to study the impact of the policy.

a) *Criteria for the selection of the regions*

To evaluate the impact of PNCRT, this study uses the intervention regions « Treatment regions » selected by the policy^{iv}. According to the presidency, the PNCRT selected areas where illicit economical activity, public disturbance, precarious rural living conditions and illegal territory control by armed groups seemed to prevail.

As we can see in table 1, the areas were grouped into three major zones of analysis; the northeast zone, that covers the regions of Catatumbo

and Arauca; a northwest region that covers the Nudo de Paramillo and Montes de María region and a large southwest region that encompasses territories from the

department of Nariño to the department of Meta. Table 1. Zones according to the PNCRT criteria.

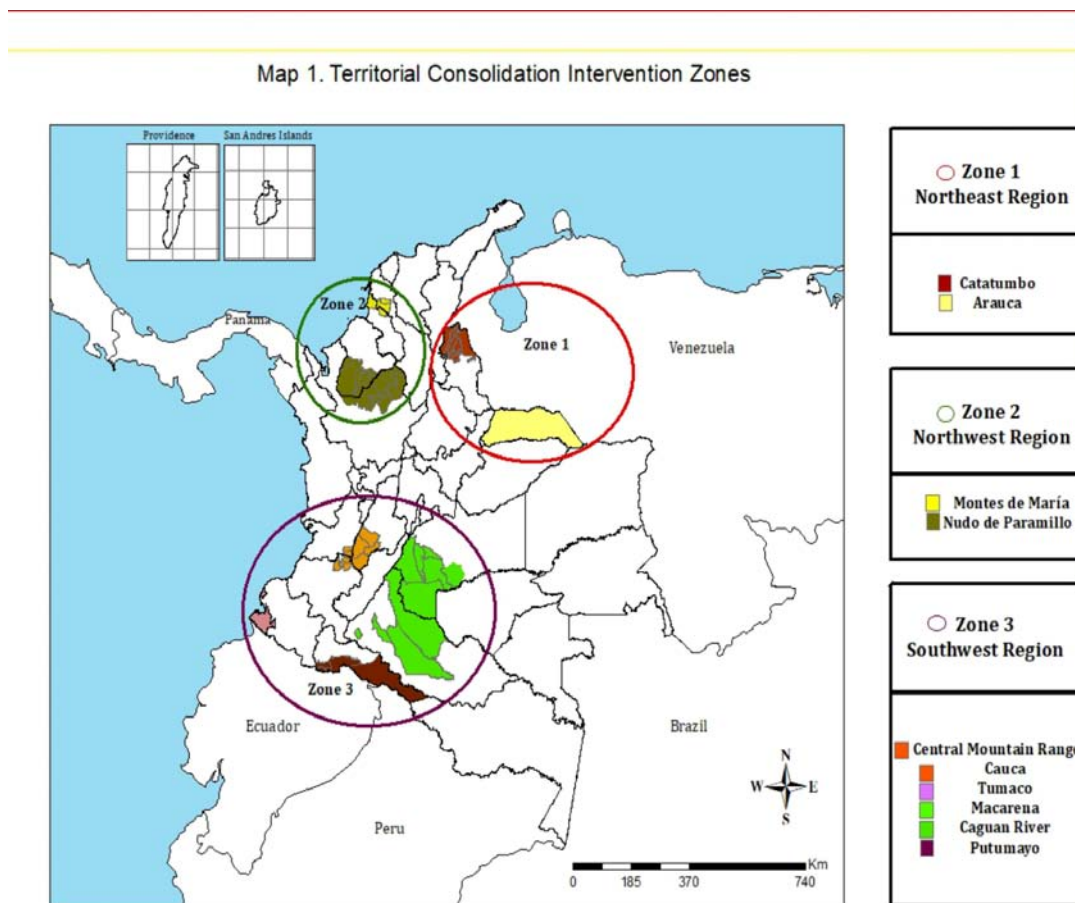
Table 1: Zones defined by the PNCRT- Regions grouped for regional analysis

Zone 1	Zone 2	Zone 3
Northeast Region	Northwest Region	Southwest Region
Catatumbo	Montes de María	Central Mountain Range
Arauca	Nudo de Paramillo	Cauca
		Tumaco
		Macarena
		Caguan River
		Putumayo

Source: created by the author

For clarity, Figure 1 shows the precise location on the map of Colombia of the 59 municipalities that were selected to be intervened by the PNCRT and on which its impacts were estimated. These municipalities, as indicated in the table above, were grouped into three

analysis zones, which are delimited in circles. It is worth reiterating that, for this study, the definition of the treatment regions, selected by the PNCRT, where the internal conflict prevailed, was taken into account.



Source: created by the author

Figure 1: Map-PNCRT Intervention Zones

As defined by the Office of the President of the Republic, the PNCRT focuses on areas with regional imbalances, repeated disturbances of public order,

territorial control by illegal armed groups, illicit economic activities, and precarious living conditions for rural populations'.

Furthermore, the policy's criteria for selecting the regions correspond to the various strategies arising from illegal activities. The impacts of the conflict reveal the way armed groups used these areas as corridors for drugs and weapons, rear-guard or protected areas, or areas rich in extractive minerals and an evolution concerning their strategies (Salas-Salazar, 2016)

The methodology for assessing the policy's impact has four components:

- Select the evaluation period and identify the treatment municipalities in the regions of internal armed conflict
- Develop Database
- Identify municipalities for the comparison and estimation strategy
- Find measures for outcome variables

b) *Selection of the evaluation period*

To assess the impact of PNCRT, it was necessary to set up a period before the intervention and a follow-up period (after it). This way, a baseline was defined from 2010, the year in which the intervention was planned but not yet implemented, and the year 2015 (period of evaluation of the impact, for post-intervention comparisons). This way, it was possible to have a suitable time to evidence the effects of the policy. Similarly, a fundamental component of the information required is the identification of the regions for the comparison (control regions), which will be explained in detail.

Finally, it should be noted that both, longitudinal information and the contrast between the outcome variable trends before and after the implementation of the policy, made the comparison between «control regions» and «treatment regions» possible.

c) *Database construction*

Three types of data constitute the analysing variables of this study. They were collected to characterise the districts where the policy would be implemented. For this purpose, data related to their social-economic conditions as well as armed conflict and the expansion of illicit crops and drug trafficking in those districts were collected. Nonetheless, to determine the impact of PNCRT, this study only focused on the data related to the armed conflict which eventually would give an account of improvement and security maintenance in each district.

To determine the internal armed conflict behaviour, two sources were consulted; on the one hand, the Unity of Attention and Integral reparation of victims, UARIV, which provided data about internal forced displacement; on the other hand, the observatory of the National Center of Historical Memory (CNMH) whose data was based on the internal armed conflict between 1985 and 2015.

According to PNCRT, data about drug war should also be taken into account to consolidate security in the districts. The Integrated Illicit Crops Monitoring System (*Sistema Integrado de Monitoreo de Cultivos Ilícitos –SIMCI*) which is part of the United Nations office on drugs and Crime provided information on this issue. For this case, a Dummy variable was developed, in which a one (1) was assigned to the districts where there are illicit farming and zero (0) where there is not.

Lastly, concerning socio-economic conditions of each district, the National Administrative Department of Statistics (*Departamento Administrativo Nacional de Estadística – DANE*) provided information about urban and rural population figures since 1985, linear distance to departmental and national capitals, municipality area, municipality altitude, and Unmet Basic Needs (*Necesidades Básicas Insatisfechas – NBI*).

d) *Identification of municipalities for the comparison*

i. *Control districts*

To assess the effect of a program intervention requires to know the difference between the result variable for an individual that has been impacted and the result variable for the same individual if the policy had not existed. The first condition is known since the information exists and the data are available; however, the second, which is a hypothetical condition, cannot be observed because data are not available; this is known as the 'counterfactual' conditional. Yet, to build it, regarding the choice of municipalities and for comparison and control purposes, it was necessary to find out districts that shared the same characteristics as «Treatment districts» in terms of socio-economic, demographic and conflict situation and that could have also been selected by the PNCRT.

ii. *The estimation or matching Method*

The statistical matching technique called *Propensity Score Matching (PSM)* was implemented to find out the «counterfactual», these municipalities or clones that had the same probability of being covered by the policy.

The objective of this methodology is to identify and weight the characteristics that make the probability distribution of the two samples similar in terms of the observable characteristics of treatment and control groups that determined that led them be part of the intervention programme.

The *Propensity Score (PS)* or participation probability, corresponds to a numerical value between zero and one for each individual that was analysed (districts that were intervened and those that were not). it represents the probability of having been selected for the program according to each one of the observed characteristics of individuals (Municipalities).

Districts were matched according to their estimated probability of being covered, given their observable characteristics. $P(x)$, i.e, those treatment and control municipalities with very similar coverage probabilities. This probability of coverage is defined as:

$$P(X) = P(D = 1|X) \quad (1)$$

where $P(D = 1|X)$ is the probability of participating in the intervention programme given a set of observable characteristics^{vi}.

Assuming that any selection bias is only due to differences in observable characteristics, the calculation of the program's impact could be estimated in a nonbiased manner, as it is showed by the difference in the average value of the outcome variables of both kinds of districts. The assumptions needed to determine the programme's effects are first, conditional independence (that is, unobservable factors that do not affect participation), and second, considerable overlap in PSs between the participating (treatment or

$$\tau_{PSM}^{ATT} = E_{P(X)|D=1}\{E[Y(1)|D = 1, P(X)] - \{E[Y(0)|D = 0, P(X)] \quad (2)$$

According to Bernal and Peña (2011, 2017), $E_{P(X)|D=1}$ is the estimated value concerning the probability of having been chosen $P(X)$; $\{E[Y(1)|D = 1, P(X)]$ is the expected value of the observable variables within the group that was covered by the PNCRT; $\{E[Y(0)|D = 1, P(X)]$ is the *contra factual*, which corresponds to the expected value of observable variables within the group where the PNCRT was implemented, in the hypothetical case they wouldn't have been intervened. The PSM estimator is the average difference between the municipalities that were covered by the PNCRT and the control municipalities of SP; it is pondered by the participation probability (PS).

On the other hand, the Simple Average Nearest Neighbour Estimator method was used, both, with and without replacement (Khandker et al., 2010). This estimator allows each treated municipality to be compared with one that has the mathematically nearest probability of having been chosen, but that was not covered by the PNCRT. Subsequently, the probability differences between each treated and untreated municipality are calculated to form a vector of distances that must be ranked from smallest to largest. Next, the value of the analysed variable for each municipality must be compared with the N municipalities with the nearest probabilities in the control group. This work used one (1) nearest neighbour (the PS was also reviewed with three and four municipalities) to find the ATT, which is given by:

$$ATT = \sum_{k=1}^N \frac{(X_k - X_{m,k})}{N_t} \quad (3)$$

N_t is the total number of municipalities targeted by the policy; the ATT value then equals the exact effect

intervened) and non-participating (control) municipalities (Caliendo, 2008; Bernal, 2011).

Both, subject to intervention and not subject to intervention distributions can be obtained by finding a PS for each municipality. There will be an area where these two distributions overlap. Observations that are not within this area of overlap should be removed from the sample to be used. This overlap area is also called the common support area (SP), and any observations of treatment municipalities with PSs greater than the maximum PS for control municipalities should also be discarded, along with those for control municipalities with PSs lower than the minimum score for treatment municipalities; (See Appendix 2).

Once the model's assumptions have met, the impact estimator for the average treatment effect of the treated group (ATT) using *Propensity Score Matching* (PSM) would be:

of the PNCRT on the analysed variable (Heckman, 1998).

Appendix 1 lists the results of the probability model for which a logit model was initially estimated. It included variables related to population, conflict, and socioeconomic conditions that make a municipality likely to be a participant of policy intervention during the period before the treatment. In this case, the variables that had the major impact were those related to years of conflict, (historical violence) and social politics, such as the coverage by a subsidized health plan.

Once this estimate was made, it proceeded to review the pre-existence of possible differences between the treatment and control groups before treatment, as presented in Appendix 3. The results of the balance analysis revealed no significant differences between the municipalities selected by the PNCRT for treatment and the control municipalities that were statistically selected according to the established criteria. Additionally, the nearest neighbour matching method of estimation was chosen because it decreases the estimated variance.

However, it should be noted that when comparing two similar municipalities, pre-existing differences could affect the evaluation results in some way. This is the case of municipalities for which some of the unobserved effects of the variables of interest persist over time. To complement the PSM method, the *difference in differences* model was then necessary to avoid any pre-existing differences that could affect the evaluation results.

iii. *Estimation strategy – The Difference in differences model*

The *difference in differences* model is commonly used in the analysis of quasi-experiments

because it brings efficiency through pre-existing conditions correction. Since it provides greater efficiency in the estimation, this method was applied in this study to correct pre-existing conditions between the control municipalities and the treatment municipalities. Logically, if the pre-existing difference had not been corrected, the estimate would have been partially endogenous (selection bias) and, therefore, the comparison of means between the control and treatment groups would not have been valid. Similarly, to implement this model, before conducting the evaluation, it was important to check the assumption of parallel trends. Hence, historical trends of each region of analysis were also reviewed. Annex 4 shows the ones that shared similar behaviours.

The proposed model for the functional form regarding the PNCRT is Imbens & Wooldridge (2007) model:

$$Y = \mu + \lambda \cdot D + \omega \cdot T + \alpha (D \cdot T) + \varepsilon \quad (4)$$

- ❖ Y is the outcome variable of interest for municipalities
- ❖ D is a Dummy variable that captures the possible differences between the treatment municipalities (D=1) and control municipalities (D=0)
- ❖ T is the Dummy variable that indicates the time when municipalities are observed and equals 1 for 2015, (the year when effects were examined).
- ❖ D.T. is an explanatory variable that is the result of multiplying the two variables; it captures aggregated factors that could cause changes in Y, even during the absence of the policy.
- ❖ λ and ω represent parameters associated with explanatory variables Y and T
- ❖ μ constitutes a parameter that shows fix effects of the model
- ❖ ε shows a random error, of average 0: $E[\varepsilon | D, T] = 0$.
- ❖ α is a coefficient of interest that determines the combined impact of variables or the interaction of explanatory variables D and T.

IV. THE IMPACT ASSESSMENT OF PNCRT

a) Measurement of outcome variables

The evaluation of the policy's effects examined the reestablishment of security in the regions intervened by the PNCRT, which is considered the absence of goal-oriented violence^{vii} due to internal armed conflict. As previously mentioned, according to the definition adopted by the U.N. in 2010, security implies the pacification of an area through a series of measures designed to reduce the risk of (peace) cessation, or of relapsing again into conflict by strengthening the conflict management capabilities of national organizations at all levels, and by laying the foundations for sustainable peace and development.

In the regions where PNCRT was implemented, the evaluation of the effects of the policy relies on the re-establishment of security, which is viewed as the absence of instrumental violence in the internal armed conflict. According to the United Nations definition, in 2010, the maintenance of security implies the territory pacification through a series of measures designed to reduce the risk of peace cessation or the relapsing again into conflict. This should be done by strengthening the conflict management capabilities of national organizations at all levels and by laying the foundations for sustainable peace and development.

However, in this sense, the concept of security depends on how this term is conceived by the government that implements the interventions and the outcome variables show the results of establishing *securitization*^{viii}. In this process, it is possible to find different meanings of the government's concept of security, which have been developed obliquely based on what it considers threats that must be addressed militarily.

In this sense and according to the government that implemented the PNCRT, there are three categories of threats to be considered. First, threats to human life and survival, which includes: targeted assassinations, specially of politicians, journalists or social leaders who oppose the violent actions of the armed forces; kidnappings, considered as the event in which a person is deprived of his liberty against his will at the hands of the Farc, the ELN, paramilitary groups or even common crime groups; forced disappearances, which may also be perpetrated by the same groups and even by State forces, according to Law 589 of 2000, it consists of the deprivation of liberty any persons in any form, followed by concealment and the refusal to acknowledge such deprivation. Other threats to human life and survival include sexual violence, defined by DIH as any act of a sexual nature against the will of the victim; recruitment of minors, that is children, adolescents, young people and adults who have been recruited to be part of the ranks of the insurgent group; displacement from homes, which occurs when individuals or families are forced to leave their homes because of armed group threat; anti-personnel mines, that is a war strategy sought to maintain control at the local level through the distribution of explosive mines in the territories and finally, massacres, defined as a group murder involving at least four deaths.

Second, threats that impact on property, such as military operations, victims of military operations, and damage to property. It is common that attacks perpetrated by insurgent groups, especially FARC or ELN, are carried out with the aim of damaging oil pipelines or electrical towers, destroying military posts, bridges or access roads to regions or any strategic communication points for economic development. (Cardenas, 2013, 26). Thirdly and last, illicit crops as

measured by the number of hectares with coca crops by a municipality.

b) PNCRT impacts

Table 2 presents the effects of the PNCRT interventions and provides totals for the country as a whole and each analysed region. The first table section lists the impacts of the policy on threats to human life and survival. According to Cardenas, Eslava and Ramirez (2013) this events stress their effects on the civilian population, who has the feeling of being the direct target of the conflict. As can be seen in the table, without exception, all of the results for the variables of interest are negative values (Targetting Killing, Kidnapping, Desappearences, Recruitment of minors, Forced displace households, Antipersonel mines, Victims of antipersonel mines (average) and Massacres); this result shows the positive impact of the

PNCRT and the improvement of security in the treated municipalities. Unfortunately, and only the variables of disappearance and recruitment of minors are not statistically significant.

The nationwide results for the demining policy stand out, as it is fundamental for the process of land restitution to displaced peasants and to comply with the agreements at the 2010 Ottawa convention. Although the demining success is partly due to the support of civilian organizations, it should not be forgotten that, historically, this has been the strict purview of the military. This has created major obstacles for joint management of the demining process since two divergent perspectives are in play. On the one hand, it is the government that imbues the process with a national security perspective, and on the other hand, civilian organizations have a more humanistic perspective.

Table 2 : Regional Impacts of the National Policy for Territorial Consolidation and Reconstruction^a

Observable Characteristics	Total	South West Region	North-East Region	North West Region
Threat to life and Human Survival				
Targetting Killing	-1,21*	-1,85*	-2,57**	1,35*
Kidnapping	-0,49*	-0,54**	-0,78	-0,105
Desappearences	-0,54	0,13	0,04	-1,30
Recrutment of minors	-0,81	-2,22***	0,128	0,46
Displace households	-108,00*	38,03	-132,74*	-246,44**
Antipersonel mines	-5,27***	-6,8**	-4,91***	-3,18*
Victims of antipersonel mines (average)	0,23***	0,07	0,81***	0,08
Massacres	-0,09*	-0,03	-0,07*	0,118
Attacks to public and private infrastructure				
Military operations	4,044***	7,335***	3,70*	0,69
Average number of victims of military actions	-0,49*	-0,67**	0,259	-0,97*
Damage to property	-1,333***	-1,61*	-0,65	-2,18***
Eradication of illicit farming				
Hectares of coca crops	428,38*	839,30*	342,22*	-12,61

Difference is statistically significant at 10%*, at 5%** at 1%***

Source: created by the author

As we can see in the table, in general, results show there was an improvement regarding security in all regions. Results about the decrease of military actions in the south part of the country, that is the cessation of hostilities against oil and electrical industry are outstanding.

Concerning the first section, the threat to human survival and life, all variables showed a decrease in the threat, which contributed to the improvement of treatment municipalities. However, for disappearance and recruitment of minors, variables were not significant

statistically speaking; that leads us not to ensure that the risk decreased.

On the other hand, results show progress in terms of the eradication of anti-personal mines. The findings in the south-west region evidence the importance of the land restitution to displaced peasants and the effort to accomplish what had been agreed during the Ottawa Convention in 2010.

The satisfactory outcomes in terms of anti-personal mines are a clear example of horizontal institutional coordination focused on a common objective, in which both civil and military organizations worked together and in a collaborative way. (Licha & Molina, 2006, in Bulla y Guarin 2015,12). Incidentally, this task was not easy because both had divergent positions; civil organisations acted based on a humanistic approach whereas the military acted according to the national security policy. Anyway, the decrease of anti-personal mines brought excellent outcomes; no doubt it is also due to the information the guerilla group FARC provided about finding explosive devices since they were in peace talks with the state. It must be said, though that it is not so in the case of victims of mine explosions; despite the efforts of military, armed groups and civilian populations, the rate of these events only decreased slightly and results are unfortunately not significant in the municipalities. About displaced household, results show a significant decrease. Indeed, in the northwest region, formed by the departments of Antioquia, Bolivar, Cordoba and Sucre a larger number of two hundred families didn't suffer from rootlessness. Outcomes about displacement are a great step ahead considering that Colombia shows internal displacement rates that are comparable to those of Siria, Iran and the Republic of Congo.

Concerning targeting killing, findings were significant; they showed close to three fewer events on average for the Catatumbo and Arauca regions; almost two fewer cases for the southern region and slightly over one less for the northwest. According to the National Center of Historical Memory, this is one of the variables that most intimidate civilian populations since it not only concerns the victim but also creates physical, emotional and social coercion that leads to silence and thus to impunity.

Last but not least, concerning the outcome variables of kidnapping and sexual violence, the rate diminished considerably. However, though results are significant, they are not conclusive because according to the method *Differences-in-differences*, based on the analysis of parallel trends, these variables presented a dissimilar behaviour before policy intervention (see appendix 4).

The second section of Table 2 presents results that showed a decline in hostilities and infrastructure damage for the south part of the country in terms of

bombings of oil pipelines and military operations. According to Pecaut (2002), attacks on infrastructure are part of a political strategy to impact security. In this sense, results were highly significant because they not only showed seven fewer military operations, that could have compromised electricity towers of Tumaco, but also had a national impact, with an average reduction of more than four events (at 99.9% average level of significance), for the country as a whole.

Lastly, the third section reveals the effects of the policy on the eradication of illicit farming. The increase in hectares planted with coca is the worst outcome in terms of the PNCRT's objectives. In general terms, it can be attributed to two circumstances: on the one hand, the planting of herbicide-resistant coca varieties called *la cuarentona* and *la gringa*; on the second hand, the fact that coca planting is highly concentrated in border regions since glyphosate fumigation is prohibited. In fact, between 2008 and 2018, the government of Colombia had to face a lawsuit before the International Justice Court in la Hague for damage caused by the aspersion of this herbicide. This is consistent with the fact that illicit farming has increased in the southwest region by more than eight hundred hectares on average, especially in the municipality of Tumaco, on the Ecuatorian border and in the department of Putumayo, which borders Ecuador and Peru in the Amazon rain forest. Similarly, coca cultivation increased significantly by more than three hundred hectares on average in the northeast region as it is located along the border with Venezuela.

On the other hand, Bulla and Guarin, (2015) have pointed out endemic elements present in municipalities like Tumaco in the southwest part of the country. This municipality is characterized by a state institutionality that doesn't reach the whole municipality and then leaves the rest of it in hands of armed organizations such as the FARC and criminal groups. Accessing these isolated territories, mostly made up of dispersed rural population, is a major difficulty, mobility costs can even reach US 40 per trip. Logically, since they are isolated and under the protection of armed and criminal groups, inhabitants of these territories contribute to the illicit activities that have been set. Furthermore, this suggests that the economic impact of institutional strengthening is not economic, while the profits from illicit crops continue to be profitable in this area. This is corroborated by the results pointed out by Aguirre (2020) where it is evident that after the intervention, the fiscal collection in terms of Industry and Commerce barely grew by less than 1%, in this part of the territory.

In contrast, the results shown in the northwest region, illicit crops have been reduced. At first glance, they seem to be satisfactory; however, it should be noted that according to data from the Ministry of Mines

and Energy, this part of the country produces a third of Colombia's gold. Of course, illicit mining generates greater benefits than illicit crops. Yet, this activity is the survival source for the inhabitants of the lower Cauca Antioqueño and unfortunately, the armed groups ensure their exploitation by contractual arrangements or the use of force and extortion. (Giraldo et al, 2010; Mc Dermott, 2013). In other words, what for Collier (2000) or Kalyvas (2006) corresponds to a transformation of the use of resources by armed groups, which find a better comparative advantage in gold extraction and in relation to illicit crops. In this same line of argument, the so-called loatable resources of Findley and Marineau (2015) are represented by gold, in the Northwest of the country.

V. CONCLUSIONS

Throughout its history, the governments of Colombia have had several initiatives to implement actions to guarantee peace in conflict zones. In fact, since the government of former ex-president Carlos Lleras (1958-1962), many administrations have tried to implement peace programs and negotiations with insurgent groups. Recently, during the mandate of former ex-president Juan Manuel Santos (2004-2008), the National Policy for Territorial Consolidation and Reconstruction (PNCRT) was implemented to ensure the irreversibility of security gains and strengthen the state's presence in territories devastated by decades of violence.

This study aimed to assess the impact on security of the National Policy of Territorial Consolidation and reconstruction (PNCRT) in the conflict territories between 2010 and 2014. It analysed the findings in the regions that were selected by the policy, that is, the north-west region (Montes de Maria and Nudo de Paramillo), the northeast region (Catatumbo and Arauca) and the southwest region (Cauca, Tumaco, Macarena, El Caguán, Tumaco and the Central Mountain range).

Research process required comparing the municipalities affected by the policy with other municipalities that share identical characteristics. It was the Propensity Score Matching method that allowed us to do this. In addition, to evaluate the impacts of the policy in terms of threats to security, threats to human life and survival, attacks on public and private infrastructure and the eradication of illicit crops, this study used the Difference in Difference technique.

In general, after the intervention of the policy in the three zones, the analysis of outcomes showed a decrease concerning attacks against public infrastructure and threats to life and human survival. (Kidnapping, targetting killing, displaced household, anti-personal-mines, victims of them, massacres,

disappearance, sexual violence and recruitment of minors. Indeed, Salas (2016) mentions that 2015 was, in fact, the year when there was the lowest percentage of violence.

The results relating to the impact of the anti-personnel mine policy should be highlighted, as it was the policy's greatest of institutional coordination achievement, bringing civil organizations together to help rural populations. In this sense, the government's strategy succeeded in involving civil society to achieve a stable and lasting peace.

The evaluation of the implementation of the PNCRT shows significant progress in terms of civil security and respect for life and dignity. It also shows signs of a recovery of political control of the conflict zones, in view of the mitigation of attacks on infrastructure. At the same time, the PNCRT does not fully achieve its objectives, in terms of reducing drug trafficking, its efforts are still incipient. Apparently, achieving institutional strengthening is not unthinkable; that would mean being able to reach the most remote rural areas of the country historically governed by their competitors, controlling the spread of illegal activities and presenting more profitable rural economic alternatives, like a National Rural Guard suggested by the Bulla y Guarín, (2015)

On the other hand, it is interesting to note that the Northwest region, where the results showed the lowest number of displaced households, coincides with the only region where no increase in illicit crops was found; in this sense, it is possible to affirm that there is a direct relationship between the expansion of illicit crops and forced displacement. However, this would be a subject of study for further research.

On the contrary, the policy did not go very far in eradicating illicit crops. The results showed a disproportionate increase in coca plantations in the study regions, except for the northwest region; there the decrease in coca leaf cultivation is evident but, unfortunately, the labour force from these crops shifted towards activity related to illicit mining. This result shows that illegality represents the most lucrative economic alternative for thousands of families and armed groups in the conflict regions. Therefore, in the future, policies that promote the eradication of illicit crops must ensure economic alternatives that can guarantee returns above those left by illicit activities. Additionally, the ineffectiveness of politics in this sense is a huge warning signal to state institutions and the peace building. As the Centre for Historical Memory has already pointed out, drug trafficking allows for the financing of armed groups, deepens inequality in the countryside because thousands of families are displaced by the growers or threatened to sell part of their land at a lower price, and increases corruption at the local level.

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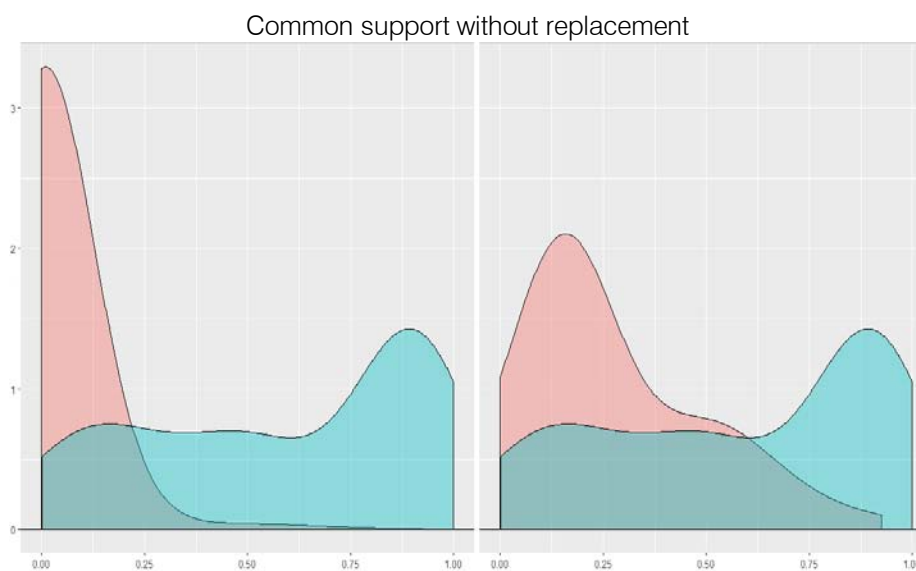
APPENDICES

Appendix 1: Probability model.

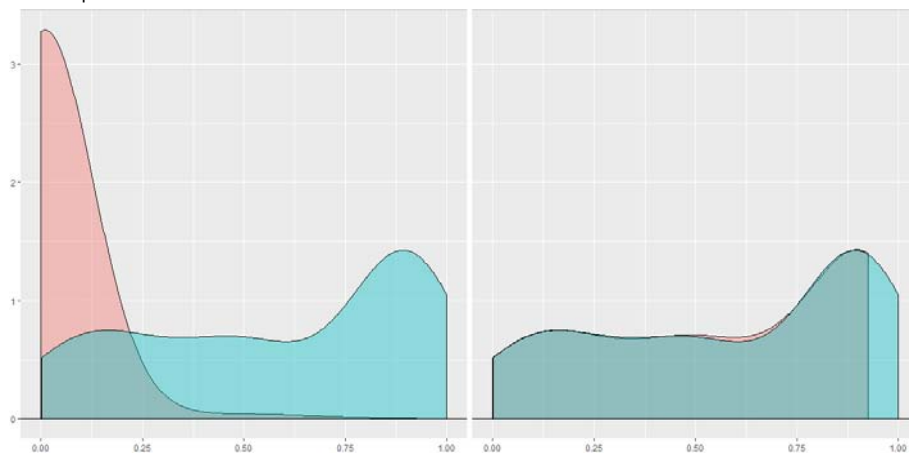
Variables	Estimated	SE	Z value	P value
Population density	-0.002881	0.003973	-0.725	0.46836
Recruitment	0.127442	0.081774	1.558	0.11912
Illicit crops	166,680,831	95,485,823	1.746	0.08088 *
Targeted assassinations	0.360332	0.142946	2.521	0.01171 *
Victims of military operations	0.159378	0.143626	1.110	0.26714
Damage to property	0.233689	0.108403	2.156	0.03110 *
Kidnappings	0.201546	0.098059	2.055	0.03984 *
Attacks on the civilian population	0.404439	0.394127	1.026	0.30481
Massacres	0.550517	0.248571	2.215	0.02678 *
Infant mortality	-0.023167	0.029185	-0.794	0.42731
Participation in previous policies	3,299,680	0.529328	6.234	4.55e-10 ***
Subsidized health care coverage	-2,983,953	1,469,414	-2.031	0.04228 *
Aqueduct (running water) coverage	0.011434	0.010379	1.102	0.27063
Garbage collection coverage	0.004079	0.014545	0.280	0.77914
Sewer system coverage	-0.012038	0.014294	-0.842	0.39968
Fiscal dependency	-1,870,447	1,124.653	-1.663	0.09629 *
Sexual violence	-0.272454	0.097969	-2.781	0.00542 **
Per capita royalties	-0.195578	0.893456	-0.219	0.82673
Total tax revenue	-5,586,407	7,971,187	-0.701	0.48341
Property tax revenue	-27,613,642	17,173,687	-1.608	0.10786
Industry/commerce (ICA) tax revenue	7,159,766	9,408,764	0.761	0.44668
Percentage of Voters	-7,207,827	5,967,211	-1.208	0.22708

Difference is statistically significant at 10%*, at 5%** at 1%***

Appendix 2- Common support probability charts



Common support with replacement



Source: created by the author

Appendix 3- Differences between the treatment and control municipalities prior to policy intervention. Balance analysis for sociodemographic characteristics

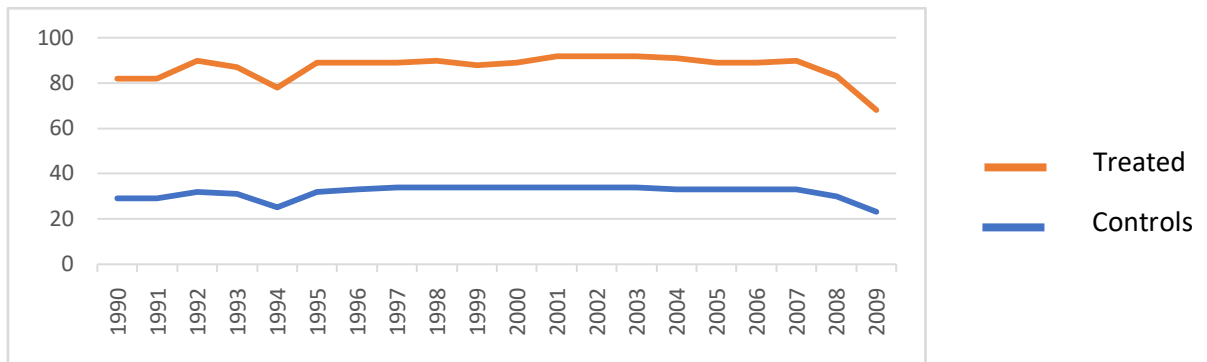
Characteristics observed in the municipalities	Treated municipalities	Technique used	
		Without replacement	With replacement
		Control	Control
Sociodemographic characteristics			
Population density	35.78	48.85 (74.86)	44.30 (77.02)
Subsidized health care coverage	0.87	0.89 (0.14)	0.86 (0.13)
Aqueduct (running water) coverage	47.31	60.47 (32.79)	46.67 (28.62)
Sewer system coverage	36.38	44.89 (34.01)	31.58 (27.35)
Garbage collection coverage	44.33	50.68 (33.05)	40.92 (27.55)
Infant mortality rate	25.09	23.56 (8.43)	23.97 (7.73)
Percentage of voters	0.53	0.54 (0.04)	0.52 (0.05)
Conflict-related characteristics			
Recruitment (total for the period 1999-2010)	7.01	5.79 (3.41)	5.30 (2.33)
Targeted assassinations (total for the period 1999-2010)	11.96	11.74 (1.91)	11.66 (1.87)
Participation in Plan Colombia	0.64	0.33 (0.47)	0.62 (0.49)
Attacks on civilians	0.37	0.40 (0.61)	0.27 (0.52)
Victims of military operations	1.42	0.94 (1.44)	0.51 (1.31)
Damage to property	1.88	1.05 (2.16)	1.40 (1.49)
Kidnappings (average for the period 1999-2010)	9.50	8.81 (2.67)	9.37 (2.53)
Massacres	1.71	1.55 (0.91)	1.53 (0.62)
Sexual violence (total for the period)	7.70	6.90	7.57

1999-2010)		(3.83)	(3.45)
Percentage of hectares of coca crops	0.00	0.00	0.00
		(0.002)	(0.00)
Tax revenue characteristics			
Fiscal dependency	0.80	0.81	0.59
		(0.21)	(0.27)
Per capita royalties	0.08	0.04	0.15
		(0.09)	(0.16)
Per capita tax revenue	0.08	0.09	0.09
		(0.14)	(0.05)
Per capita property tax revenue	0.01	0.01	0.01
		(0.01)	(0.01)
Per capita industry and commerce tax revenue	0.02	0.03	0.04
		(0.11)	(0.03)

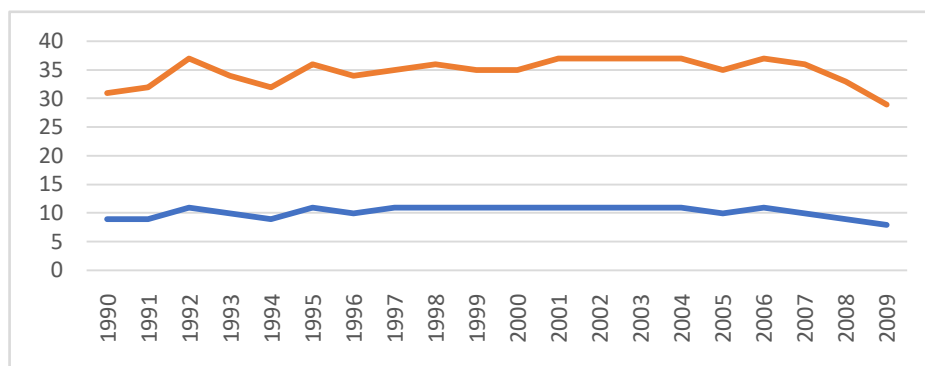
Note: the figures for each variable are averages and the standard deviation is indicated below in parentheses.
 Source: created by the author

Appendix 4- Parallel trend charts

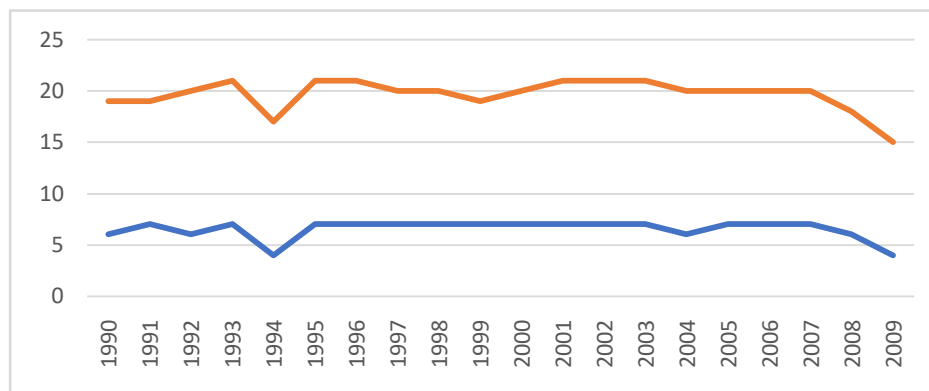
Targeted assassinations (1990-2009)- Total national



Targeted assassinations (1990-2009) Southwest



Targeted assassinations (1990-2009) North-east



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- iii. Article 26 of the National Development Plan 2010-2014, the Congress of the Republic in 2011 determined that the strategic direction of the PNCRT would be the responsibility of the National Security Council
- iv. The areas to start the consolidation were the Macarena and Caguan River Zone, Pacific Zone (Nariño, Cauca, Buenaventura, South Choco), Lower Cauca Antioquia and South Cordoba Zone, South Tolima and South Valle del Cauca. The transition areas were the Montes de Maria Zone, the Sierra Nevada de Santa Marta Zone and the Eastern Antioquia Zone. And finally, the complementary areas were the Arauca Zone, Putumayo Zone, Catatumbo Zone and Bajo Atrato Zone (Presidency of the Republic, 2009).
- v. Main text. *Política Nacional de Consolidación y Reconstrucción Territorial* (National Policy for Territorial Consolidation and Reconstruction). Version 1- 2012; page 6.
- vi. This method assumes that unobservable or unavailable variables are not determining factors in the participation of the policy.
- vii. This is understood as violence for the purpose of eliminating, intimidating, or provoking an opponent. Green P., and Ward T., *State-Building and the Logic of Violence in Iraq*; page 49.
- viii. According to Barry Buzan and Ole Wæver, the action of promoting or creating security is the *discursive* process through which an intersubjective understanding is developed within a political community to treat something like an existing threat towards a valued object, and to enable urgent and exceptional measures to deal with the threat. Therefore, some variables should be viewed as humanitarian issues, such as anti-personnel mines, and variables such as hectares of coca crops that are more of an economic issue than a national security one but that are considered by the policy to be a security problem.

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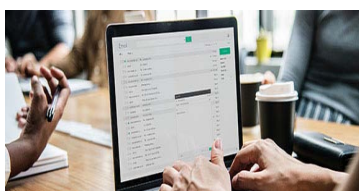
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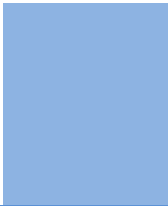
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Design has been recognized to be essential to experiments for a considerable time, and the editor has decided that any paper that appears not to have adequate numerical treatments of the data will be returned unrefereed.

- i) Discussion should cover implications and consequences and not just recapitulate the results; conclusions should also be summarized.
- j) There should be brief acknowledgments.
- k) There ought to be references in the conventional format. Global Journals recommends APA format.

Authors should carefully consider the preparation of papers to ensure that they communicate effectively. Papers are much more likely to be accepted if they are carefully designed and laid out, contain few or no errors, are summarizing, and follow instructions. They will also be published with much fewer delays than those that require much technical and editorial correction.

The Editorial Board reserves the right to make literary corrections and suggestions to improve brevity.



FORMAT STRUCTURE

It is necessary that authors take care in submitting a manuscript that is written in simple language and adheres to published guidelines.

All manuscripts submitted to Global Journals should include:

Title

The title page must carry an informative title that reflects the content, a running title (less than 45 characters together with spaces), names of the authors and co-authors, and the place(s) where the work was carried out.

Author details

The full postal address of any related author(s) must be specified.

Abstract

The abstract is the foundation of the research paper. It should be clear and concise and must contain the objective of the paper and inferences drawn. It is advised to not include big mathematical equations or complicated jargon.

Many researchers searching for information online will use search engines such as Google, Yahoo or others. By optimizing your paper for search engines, you will amplify the chance of someone finding it. In turn, this will make it more likely to be viewed and cited in further works. Global Journals has compiled these guidelines to facilitate you to maximize the web-friendliness of the most public part of your paper.

Keywords

A major lynchpin of research work for the writing of research papers is the keyword search, which one will employ to find both library and internet resources. Up to eleven keywords or very brief phrases have to be given to help data retrieval, mining, and indexing.

One must be persistent and creative in using keywords. An effective keyword search requires a strategy: planning of a list of possible keywords and phrases to try.

Choice of the main keywords is the first tool of writing a research paper. Research paper writing is an art. Keyword search should be as strategic as possible.

One should start brainstorming lists of potential keywords before even beginning searching. Think about the most important concepts related to research work. Ask, "What words would a source have to include to be truly valuable in a research paper?" Then consider synonyms for the important words.

It may take the discovery of only one important paper to steer in the right keyword direction because, in most databases, the keywords under which a research paper is abstracted are listed with the paper.

Numerical Methods

Numerical methods used should be transparent and, where appropriate, supported by references.

Abbreviations

Authors must list all the abbreviations used in the paper at the end of the paper or in a separate table before using them.

Formulas and equations

Authors are advised to submit any mathematical equation using either MathJax, KaTeX, or LaTeX, or in a very high-quality image.

Tables, Figures, and Figure Legends

Tables: Tables should be cautiously designed, uncrowned, and include only essential data. Each must have an Arabic number, e.g., Table 4, a self-explanatory caption, and be on a separate sheet. Authors must submit tables in an editable format and not as images. References to these tables (if any) must be mentioned accurately.



Figures

Figures are supposed to be submitted as separate files. Always include a citation in the text for each figure using Arabic numbers, e.g., Fig. 4. Artwork must be submitted online in vector electronic form or by emailing it.

PREPARATION OF ELECTRONIC FIGURES FOR PUBLICATION

Although low-quality images are sufficient for review purposes, print publication requires high-quality images to prevent the final product being blurred or fuzzy. Submit (possibly by e-mail) EPS (line art) or TIFF (halftone/ photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Avoid using pixel-oriented software. Scans (TIFF only) should have a resolution of at least 350 dpi (halftone) or 700 to 1100 dpi (line drawings). Please give the data for figures in black and white or submit a Color Work Agreement form. EPS files must be saved with fonts embedded (and with a TIFF preview, if possible).

For scanned images, the scanning resolution at final image size ought to be as follows to ensure good reproduction: line art: >650 dpi; halftones (including gel photographs): >350 dpi; figures containing both halftone and line images: >650 dpi.

Color charges: Authors are advised to pay the full cost for the reproduction of their color artwork. Hence, please note that if there is color artwork in your manuscript when it is accepted for publication, we would require you to complete and return a Color Work Agreement form before your paper can be published. Also, you can email your editor to remove the color fee after acceptance of the paper.

TIPS FOR WRITING A GOOD QUALITY MANAGEMENT RESEARCH PAPER

Techniques for writing a good quality management and business research paper:

1. Choosing the topic: In most cases, the topic is selected by the interests of the author, but it can also be suggested by the guides. You can have several topics, and then judge which you are most comfortable with. This may be done by asking several questions of yourself, like "Will I be able to carry out a search in this area? Will I find all necessary resources to accomplish the search? Will I be able to find all information in this field area?" If the answer to this type of question is "yes," then you ought to choose that topic. In most cases, you may have to conduct surveys and visit several places. Also, you might have to do a lot of work to find all the rises and falls of the various data on that subject. Sometimes, detailed information plays a vital role, instead of short information. Evaluators are human: The first thing to remember is that evaluators are also human beings. They are not only meant for rejecting a paper. They are here to evaluate your paper. So present your best aspect.

2. Think like evaluators: If you are in confusion or getting demotivated because your paper may not be accepted by the evaluators, then think, and try to evaluate your paper like an evaluator. Try to understand what an evaluator wants in your research paper, and you will automatically have your answer. Make blueprints of paper: The outline is the plan or framework that will help you to arrange your thoughts. It will make your paper logical. But remember that all points of your outline must be related to the topic you have chosen.

3. Ask your guides: If you are having any difficulty with your research, then do not hesitate to share your difficulty with your guide (if you have one). They will surely help you out and resolve your doubts. If you can't clarify what exactly you require for your work, then ask your supervisor to help you with an alternative. He or she might also provide you with a list of essential readings.

4. Use of computer is recommended: As you are doing research in the field of management and business then this point is quite obvious. Use right software: Always use good quality software packages. If you are not capable of judging good software, then you can lose the quality of your paper unknowingly. There are various programs available to help you which you can get through the internet.

5. Use the internet for help: An excellent start for your paper is using Google. It is a wondrous search engine, where you can have your doubts resolved. You may also read some answers for the frequent question of how to write your research paper or find a model research paper. You can download books from the internet. If you have all the required books, place importance on reading, selecting, and analyzing the specified information. Then sketch out your research paper. Use big pictures: You may use encyclopedias like Wikipedia to get pictures with the best resolution. At Global Journals, you should strictly follow here.



6. Bookmarks are useful: When you read any book or magazine, you generally use bookmarks, right? It is a good habit which helps to not lose your continuity. You should always use bookmarks while searching on the internet also, which will make your search easier.

7. Revise what you wrote: When you write anything, always read it, summarize it, and then finalize it.

8. Make every effort: Make every effort to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in the introduction—what is the need for a particular research paper. Polish your work with good writing skills and always give an evaluator what he wants. Make backups: When you are going to do any important thing like making a research paper, you should always have backup copies of it either on your computer or on paper. This protects you from losing any portion of your important data.

9. Produce good diagrams of your own: Always try to include good charts or diagrams in your paper to improve quality. Using several unnecessary diagrams will degrade the quality of your paper by creating a hodgepodge. So always try to include diagrams which were made by you to improve the readability of your paper. Use of direct quotes: When you do research relevant to literature, history, or current affairs, then use of quotes becomes essential, but if the study is relevant to science, use of quotes is not preferable.

10. Use proper verb tense: Use proper verb tenses in your paper. Use past tense to present those events that have happened. Use present tense to indicate events that are going on. Use future tense to indicate events that will happen in the future. Use of wrong tenses will confuse the evaluator. Avoid sentences that are incomplete.

11. Pick a good study spot: Always try to pick a spot for your research which is quiet. Not every spot is good for studying.

12. Know what you know: Always try to know what you know by making objectives, otherwise you will be confused and unable to achieve your target.

13. Use good grammar: Always use good grammar and words that will have a positive impact on the evaluator; use of good vocabulary does not mean using tough words which the evaluator has to find in a dictionary. Do not fragment sentences. Eliminate one-word sentences. Do not ever use a big word when a smaller one would suffice. Verbs have to be in agreement with their subjects. In a research paper, do not start sentences with conjunctions or finish them with prepositions. When writing formally, it is advisable to never split an infinitive because someone will (wrongly) complain. Avoid clichés like a disease. Always shun irritating alliteration. Use language which is simple and straightforward. Put together a neat summary.

14. Arrangement of information: Each section of the main body should start with an opening sentence, and there should be a changeover at the end of the section. Give only valid and powerful arguments for your topic. You may also maintain your arguments with records.

15. Never start at the last minute: Always allow enough time for research work. Leaving everything to the last minute will degrade your paper and spoil your work.

16. Multitasking in research is not good: Doing several things at the same time is a bad habit in the case of research activity. Research is an area where everything has a particular time slot. Divide your research work into parts, and do a particular part in a particular time slot.

17. Never copy others' work: Never copy others' work and give it your name because if the evaluator has seen it anywhere, you will be in trouble. Take proper rest and food: No matter how many hours you spend on your research activity, if you are not taking care of your health, then all your efforts will have been in vain. For quality research, take proper rest and food.

18. Go to seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.

19. Refresh your mind after intervals: Try to give your mind a rest by listening to soft music or sleeping in intervals. This will also improve your memory. Acquire colleagues: Always try to acquire colleagues. No matter how sharp you are, if you acquire colleagues, they can give you ideas which will be helpful to your research.

20. Think technically: Always think technically. If anything happens, search for its reasons, benefits, and demerits. Think and then print: When you go to print your paper, check that tables are not split, headings are not detached from their descriptions, and page sequence is maintained.



21. Adding unnecessary information: Do not add unnecessary information like "I have used MS Excel to draw graphs." Irrelevant and inappropriate material is superfluous. Foreign terminology and phrases are not apropos. One should never take a broad view. Analogy is like feathers on a snake. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Never oversimplify: When adding material to your research paper, never go for oversimplification; this will definitely irritate the evaluator. Be specific. Never use rhythmic redundancies. Contractions shouldn't be used in a research paper. Comparisons are as terrible as clichés. Give up ampersands, abbreviations, and so on. Remove commas that are not necessary. Parenthetical words should be between brackets or commas. Understatement is always the best way to put forward earth-shaking thoughts. Give a detailed literary review.

22. Report concluded results: Use concluded results. From raw data, filter the results, and then conclude your studies based on measurements and observations taken. An appropriate number of decimal places should be used. Parenthetical remarks are prohibited here. Proofread carefully at the final stage. At the end, give an outline to your arguments. Spot perspectives of further study of the subject. Justify your conclusion at the bottom sufficiently, which will probably include examples.

23. Upon conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium through which your research is going to be in print for the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects of your research.

INFORMAL GUIDELINES OF RESEARCH PAPER WRITING

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form which is presented in the guidelines using the template.
- Please note the criteria peer reviewers will use for grading the final paper.

Final points:

One purpose of organizing a research paper is to let people interpret your efforts selectively. The journal requires the following sections, submitted in the order listed, with each section starting on a new page:

The introduction: This will be compiled from reference matter and reflect the design processes or outline of basis that directed you to make a study. As you carry out the process of study, the method and process section will be constructed like that. The results segment will show related statistics in nearly sequential order and direct reviewers to similar intellectual paths throughout the data that you gathered to carry out your study.

The discussion section:

This will provide understanding of the data and projections as to the implications of the results. The use of good quality references throughout the paper will give the effort trustworthiness by representing an alertness to prior workings.

Writing a research paper is not an easy job, no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record-keeping are the only means to make straightforward progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear: Adhere to recommended page limits.

Mistakes to avoid:

- Insertion of a title at the foot of a page with subsequent text on the next page.
- Separating a table, chart, or figure—confine each to a single page.
- Submitting a manuscript with pages out of sequence.
- In every section of your document, use standard writing style, including articles ("a" and "the").
- Keep paying attention to the topic of the paper.



- Use paragraphs to split each significant point (excluding the abstract).
- Align the primary line of each section.
- Present your points in sound order.
- Use present tense to report well-accepted matters.
- Use past tense to describe specific results.
- Do not use familiar wording; don't address the reviewer directly. Don't use slang or superlatives.
- Avoid use of extra pictures—include only those figures essential to presenting results.

Title page:

Choose a revealing title. It should be short and include the name(s) and address(es) of all authors. It should not have acronyms or abbreviations or exceed two printed lines.

Abstract: This summary should be two hundred words or less. It should clearly and briefly explain the key findings reported in the manuscript and must have precise statistics. It should not have acronyms or abbreviations. It should be logical in itself. Do not cite references at this point.

An abstract is a brief, distinct paragraph summary of finished work or work in development. In a minute or less, a reviewer can be taught the foundation behind the study, common approaches to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Use comprehensive sentences, and do not sacrifice readability for brevity; you can maintain it succinctly by phrasing sentences so that they provide more than a lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study with the subsequent elements in any summary. Try to limit the initial two items to no more than one line each.

Reason for writing the article—theory, overall issue, purpose.

- Fundamental goal.
- To-the-point depiction of the research.
- Consequences, including definite statistics—if the consequences are quantitative in nature, account for this; results of any numerical analysis should be reported. Significant conclusions or questions that emerge from the research.

Approach:

- Single section and succinct.
- An outline of the job done is always written in past tense.
- Concentrate on shortening results—limit background information to a verdict or two.
- Exact spelling, clarity of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else.

Introduction:

The introduction should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable of comprehending and calculating the purpose of your study without having to refer to other works. The basis for the study should be offered. Give the most important references, but avoid making a comprehensive appraisal of the topic. Describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will give no attention to your results. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here.

The following approach can create a valuable beginning:

- Explain the value (significance) of the study.
- Defend the model—why did you employ this particular system or method? What is its compensation? Remark upon its appropriateness from an abstract point of view as well as pointing out sensible reasons for using it.
- Present a justification. State your particular theory(-ies) or aim(s), and describe the logic that led you to choose them.
- Briefly explain the study's tentative purpose and how it meets the declared objectives.



Approach:

Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done. Sort out your thoughts; manufacture one key point for every section. If you make the four points listed above, you will need at least four paragraphs. Present surrounding information only when it is necessary to support a situation. The reviewer does not desire to read everything you know about a topic. Shape the theory specifically—do not take a broad view.

As always, give awareness to spelling, simplicity, and correctness of sentences and phrases.

Procedures (methods and materials):

This part is supposed to be the easiest to carve if you have good skills. A soundly written procedures segment allows a capable scientist to replicate your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order, but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt to give the least amount of information that would permit another capable scientist to replicate your outcome, but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section.

When a technique is used that has been well-described in another section, mention the specific item describing the way, but draw the basic principle while stating the situation. The purpose is to show all particular resources and broad procedures so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step-by-step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

Materials may be reported in part of a section or else they may be recognized along with your measures.

Methods:

- Report the method and not the particulars of each process that engaged the same methodology.
- Describe the method entirely.
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures.
- Simplify—detail how procedures were completed, not how they were performed on a particular day.
- If well-known procedures were used, account for the procedure by name, possibly with a reference, and that's all.

Approach:

It is embarrassing to use vigorous voice when documenting methods without using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result, when writing up the methods, most authors use third person passive voice.

Use standard style in this and every other part of the paper—avoid familiar lists, and use full sentences.

What to keep away from:

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings—save it for the argument.
- Leave out information that is immaterial to a third party.

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part as entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Use statistics and tables, if suitable, to present consequences most efficiently.

You must clearly differentiate material which would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matters should not be submitted at all except if requested by the instructor.



Content:

- Sum up your conclusions in text and demonstrate them, if suitable, with figures and tables.
- In the manuscript, explain each of your consequences, and point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation of an exacting study.
- Explain results of control experiments and give remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or manuscript.

What to stay away from:

- Do not discuss or infer your outcome, report surrounding information, or try to explain anything.
- Do not include raw data or intermediate calculations in a research manuscript.
- Do not present similar data more than once.
- A manuscript should complement any figures or tables, not duplicate information.
- Never confuse figures with tables—there is a difference.

Approach:

As always, use past tense when you submit your results, and put the whole thing in a reasonable order.

Put figures and tables, appropriately numbered, in order at the end of the report.

If you desire, you may place your figures and tables properly within the text of your results section.

Figures and tables:

If you put figures and tables at the end of some details, make certain that they are visibly distinguished from any attached appendix materials, such as raw facts. Whatever the position, each table must be titled, numbered one after the other, and include a heading. All figures and tables must be divided from the text.

Discussion:

The discussion is expected to be the trickiest segment to write. A lot of papers submitted to the journal are discarded based on problems with the discussion. There is no rule for how long an argument should be.

Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implications of the study. The purpose here is to offer an understanding of your results and support all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of results should be fully described.

Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact, you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved the prospect, and let it drop at that. Make a decision as to whether each premise is supported or discarded or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."

Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work.

- You may propose future guidelines, such as how an experiment might be personalized to accomplish a new idea.
- Give details of all of your remarks as much as possible, focusing on mechanisms.
- Make a decision as to whether the tentative design sufficiently addressed the theory and whether or not it was correctly restricted. Try to present substitute explanations if they are sensible alternatives.
- One piece of research will not counter an overall question, so maintain the large picture in mind. Where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.



Approach:

When you refer to information, differentiate data generated by your own studies from other available information. Present work done by specific persons (including you) in past tense.

Describe generally acknowledged facts and main beliefs in present tense.

THE ADMINISTRATION RULES

Administration Rules to Be Strictly Followed before Submitting Your Research Paper to Global Journals Inc.

Please read the following rules and regulations carefully before submitting your research paper to Global Journals Inc. to avoid rejection.

Segment draft and final research paper: You have to strictly follow the template of a research paper, failing which your paper may get rejected. You are expected to write each part of the paper wholly on your own. The peer reviewers need to identify your own perspective of the concepts in your own terms. Please do not extract straight from any other source, and do not rephrase someone else's analysis. Do not allow anyone else to proofread your manuscript.

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CRITERION FOR GRADING A RESEARCH PAPER (COMPILATION)
BY GLOBAL JOURNALS

Please note that following table is only a Grading of "Paper Compilation" and not on "Performed/Stated Research" whose grading solely depends on Individual Assigned Peer Reviewer and Editorial Board Member. These can be available only on request and after decision of Paper. This report will be the property of Global Journals.

Topics	Grades		
	A-B	C-D	E-F
<i>Abstract</i>	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form Above 200 words	No specific data with ambiguous information Above 250 words
<i>Introduction</i>	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
<i>Methods and Procedures</i>	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
<i>Result</i>	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
<i>Discussion</i>	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
<i>References</i>	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring



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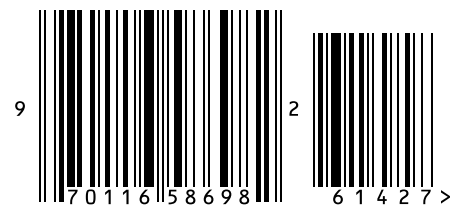
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