ICT Competencies of Project Management Personnel at Local Government Level in Ghana

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Abstract-In a drive towards the attainment of a paperless mode of managing projects and its delivery, the Government of Ghana in the last few years, has embarked on several policy initiatives to achieve this objective in public organizations. The challenges associated with the paperless drive do not lie solely with the deployment of software and hardware. The degree of success also depends primarily on the capabilities of personnel operating the software programs and hardware tools available within the specific Local Government Organization. Regardless of the appropriateness of software programs for project management and project delivery, studies indicate that project managers must have some basic requisite knowledge and competencies in ICTs to compliment the deployment of technology to make their organizational performance and effectiveness useful. With the introduction of policies such as the Information Communication Technology for Accelerated Development (ICT 4AD), there comes the need to review the literacy level of personnel who will be utilizing these programs to ensure success of project deliverables. This paper assesses the capabilities of project management personnel at the local government level using quantitative method hinged on a goodness of fit test. This study also reviews the Information and Communications Technology literacy and competency levels of personnel in charge of projects management administration at the Local Government level. The conclusions indicate that personnel at this level are not be adequately prepared to operationalize the ICT enabled paperless system. The recommendations for successful implementation of paperless management of projects and programmes at the local government level requires an overhaul of the capacities of all project management personnel and local government staff as a whole through training and education.

Keywords- *Competence, ICT, Literacy Levels, Local Government, Project Management*

I. INTRODUCTION

All over the world, Information and Communications Technology (ICT) integration has become an accepted norm for improving organization's basic operation. It has become imperative as a nation to strive towards such an ideal goal. The Government of Ghana has currently embarked on several initiatives to attaining a paperless project management and administration system in public organizations including the Local Government Service. It is said however, that "a machine is only as good as its operator". Successful utilization of ICTs for infrastructural project management can only be attained when the personnel employed to use these systems are literate and competent. At the Local Government Level, the need for optimum project delivery cannot be understated. Stakeholders have become very vigilante on what public funds for projects are used for. Citizens demand accountability and proof of value for money in project delivered. It has become imperative to deliver public projects within acceptable budgets, reasonable time frames and to high quality standards. With the introduction of ICTs into Project Management Systems all over the world, managing projects have become easier and so has the means of planning, monitoring and evaluating same.

Competent and knowledgeable personnel are critical resource necessary for any successful project conception and implementation. In a bid to deploy ICT techniques and strategies across Local Government Organizations (LGOs), stakeholders must step back and analyze the ICT competencies of all the personnel. To do this, an investigation must be conducted into the degree of ICT literacy and competence of the project personnel. Basic ICT knowledge is barely enough. 0Project Management Personnel need to possess project management skills as well as training in the software application in project management. ICT programs only seek to make the activities performed in project management easier and accessible to all stakeholders on the project. This paper is an examination of the ICT literacy levels of the personnel who are in charge of project management at the LGO level. At the grass root level, the success or failure of projects in the future will depend on the level of ICT integration into the organization's project management systems.

II. THEORETICAL FRAMEWORK AND REVIEW

Public projects always require extensive monitoring strategies to ensure their success. This is because the levels of bureaucracy associated with most public projects do not

provide the appropriate mechanisms and processes to render proper project accountability and transparency [6]. To be effective and ultimately efficient in the management of public projects, some form of strict ICT protocols ought to be established amongst stakeholders with specific deliverables, bench marked to ensure adherence to project objectives [7].

With the integration of new management tools within any organization, the key players for successful implementation are identified as the human resource and personnel within the organization. This forms a core pillar for attaining project goals. *Knowledge management* is the systematic management of an organization's knowledge assets for the purpose of creating value and meeting tactical & strategic requirements. Information management requires the use of resources to create an environment in which information is accessible to individuals and in which individuals acquire, share, use and apply that information for the benefit of the organization. Successful knowledge management is more than just implementing new technology and new systems and, in this case, new means of improving organizational operations. The creation of a new organizational culture becomes real when knowledge workers actually apply their new knowledge practically for the benefit of the organization [23].

A. Knowledge Management of The Human Resource

Knowledge management is about developing, sharing and applying knowledge within the organization to gain and sustain its competitive advantage. Knowledge management and its application are arguably dependent on people. Human resource management activities, such as recruitment and selection, education and development, performance management, pay and rewards, as well as the creation of a learning culture, are vital for managing knowledge within organizations [23].

Knowledge management in organizations has always been a difficult area for organizational development especially the leveraging of TACIT knowledge amongst members of the organization. Organizations have immense benefit when they retain tacit knowledge in firms where the people who run the organization are ICT literate and employ automation in the work environment: Omotayo[14] posited that knowledge management has become a key success driver in the 21st Century for organizational performance and a critical tool for organizational profitability and competitiveness and ensures the ultimate survival of the organization. In organizations where the personnel are ICT literate, knowledge gets to be shared with speed and these organizations are seen to perform better with great competitive advantage. ICTs have tremendous impact on the performance of the human resource element of organizations [12]. In effect, organizations that intend to remain competitive by utilizing knowledge effectively will be required to pay attention to these three critical components: - people, processes and technology [22]. These will ensure the success of the organization if the concept is based on connecting knowledgeable people who undertake the firm's processes with the appropriate tools in a bid to leveraging this knowledge for effective delivery [14].

With specific reference to Public Sector Organizations (PSO), the Project Management Institute (PMI) stipulates that

there are some knowledge management skills that will be required from key players and stakeholders to ensure efficiency and the ultimate success of the projects undertaken by these organizations. The deployment of ICTs across these knowledge management areas will ensure greater efficiency and effectiveness of organizations that deploy the appropriate technologies.

1) Project Integration Management

Project integration includes the processes and activities needed to identify, define, combine, unify, and coordinate the various processes of all project management activities within the project management process groups. This area is primarily concerned with getting project management personnel to effectively integrating the processes in all other project knowledge areas such as the scope, time, cost, quality, human resource, communication, risk, procurement and stakeholder management within the project management process groups [11].

2) Project Scope Management

This involves all the processes project managers go through to adequately define, monitor, control, develop and manage the scope of the project. It ensures that all the work required, and only the work required to complete the project, is included in the project for execution. Throughout the life of the project, project scope management needs be ensured [21].

3) Project Time Management

This requires project managers to certify that all the activities required to appropriately ensure the ultimate and maximum use of time during the life of a project is delivered within the stipulated time frame. This can be achieved through good organization, efficient productivity and proper planning. This skill is required to enable projects to be delivered in the shortest possible time and at cost efficient means [25]. Typically, it involves four main steps. Identifying the activities, Sequencing the activities, Estimating the activity resources and finally developing and controlling the schedule. When done right, these steps aid in managing the time schedule of the entire project.

Additionally, there are other tools and techniques that are required for time management in order to assess, analyze and measure time management schedules and plans and milestones [24].

4) Project Cost Management

Project Cost Management is generally involved in the estimating, budgeting and controlling of costs in order that the project under execution meets the required budget. Various tools and techniques are used in this process. Certain financial terms that affect project costs need to be understood. They include project direct and indirect costs, variable costs, profits, cash flows and reserves. These costs are to be monitored and controlled so they do not exceed budgeted and approved costs [10].

5) Project Quality Management

Project Quality Management comprises of all activities and actions project managers undertake to ensure the highest form of Total Quality Management during the project execution

phase. Obtaining quality in a project cannot be compromised. The core outcomes of a project are connected to the quality of the project delivered. Quality management does not begin when the project is almost complete but should be incorporated into the mode of operations from the inception of the project to the end of it and even after it is completed. Quality management would keep track of the quality outcomes at every stage of the project [11].

6) Project Human Resource Management

As projects are only possible with the involvement of human resources, the management of these personnel becomes a very crucial task for most project managers. Most of the resources are easy to control however, human behavior and the human motivators to drive the success of project are quite difficult to manage. Management of workers and key stakeholders of the project require various skills set from managers [9][23].

7) Project Communication Management.

All participants of a project should be able to keep abreast with progress of projects only if effective communication systems are in place. As part of the project progress, there are new ICT systems that would keep members up to date and abreast with proceedings, this becomes essential to the success of the project. Project communication management becomes imperative and project managers will be required to exhibit skills, knowledge and management of project information systems for the benefit of the project [3][12].

8) Project Risk Management

All projects regardless of the form carry a form of risk. By virtue of the execution of any project, there are inherent and unavoidable risks that must be borne or mitigated. The positive risks factors are the opportunities and the negative ones becomes the threats. Whether threats or opportunities, they must be managed properly in order to take proper advantage of the opportunities and maximize them whilst reducing or eliminating the threats. Risks in projects are very volatile and fluid and as such need to be monitored closely. One risk at a particular point or phase within the project may be non-existent or maybe reduced at another point [11].

9) Project Procurement

Project procurement involves the creation and establishment of relationships with suppliers and sellers of various components and resources necessary for the success of projects. These suppliers need to be managed properly to ensure that they do not disrupt the work flow with delayed supplies which comes with its attendant cost implications. Proper and constant communication with suppliers at every stage of the project to obtain materials and goods at their required time to enable smooth work processes must be guaranteed to ensure cost and time effectiveness. These skill set are required to efficiently manage resources in every organizations [6].

B. Enterprise Resource Management (ERP)

The most effective model that would aid and maximize organizational processes for optimum delivery is the Enterprise Resource Planning. Commonly referred to as ERP, this is an enterprise-wide information system that facilitates the flow of information and coordinates all resources and activities within the organization. One major advantage of using ERPs is the reduction in costs of operation [1].

These systems organize and integrate all operational processes and information flow to make optimum use of resources. These resources are time, materials, labour, capital and machinery. ERPs are flexible and can be tailored and modified to fit into the needs and operations of the organization. ERPs can be made to adapt to the changing needs of the organization [16]. Additionally, it does not only manage internal resources but it is able to integrate external resources and hence is efficient for Public Sector organizations which make use of external data and information during the life of projects. In effect, ERPs enable sufficient interaction between all stakeholders of projects in a virtual environment.

There are challenges that confront successful ERP implementation in Public Sector Organizations and these include the lack of skill to operate the system full scale and the issues of corrupt practices [1].

Botchway et al [3] corroborated by [1] argue that the full benefits and objectives of ERP implementation could be hampered by the level of competence and capacities of personnel employed within the specific organizations.

1) Human Resource Hindrances to Implementation of ERPs

One of the major challenges of implementing ERP in the public sector is the degree of corruption permeating the public sector. The extent of corruption seemingly engaged in by administrators and employees poses a hindrance to the effective implementation of ERP in the public sector of Ghana. It is believed that the attitudes and culture of business owners and top management have a strong and direct impact on the attitudes and culture of their employees [18], [5], [2]. Poor leadership skills of civil servants often translate into inappropriate attitudes towards every enterprise associated with doing business with this sector [13]. Since ERPs are integrated end-to-end systems, their successful implementation in an organization will be dependent on the behavior and attitude of everyone in the firm who uses the system [9].

In effect, where employees of the organization tend to misconstrue business processes, circumvent laid down procedure as well as use the system for their personal gain, the success of the ERP implementation is likely to suffer [4] [19]. Poor organizational culture of public institutions poses another challenge to ERP adoption in Ghana.

Indeed, it is argued [20] that being data-driven is key to enhancing organizational performance. The more the companies adopt the character of being "data-driven", the better they performed in terms of their finances, operations and competitiveness [20]. Unfortunately, the data utilization culture of public institutions in Ghana appears to be very poor.

Generally, the organizations, managers and employees, do not place much value on data and information processing as a strategic tool in their operations and decision making [3]. Some organizations rarely conduct market surveys, analyze past data

trends to predict future growth patterns, or use data as a good foundation for decision making. This underdeveloped data utilization culture of indigenous businesses and public sector organizations serves as a barrier to ERP implementation, acceptance and deployment in Ghana [3].

Consequently, there appears to be a general concession that ERP systems are very complicated. This has led to a situation where most management executives of organizations are scared of the prospect of adopting and implementing some of these integrated information systems [8]. Furthermore, the perceived complication of ERP utilization may stem from the low levels of education of administrators and managers and in some instances the general lack of awareness and understanding of information systems [8] [19]. It appears that only a small proportion of public sector administrators in developing countries are abreast with the potential operational benefits of Information and Communications Technology systems, and by extension ERP systems [19]. The perceived complications of ERPs utilization, coupled with the low ICT literacy levels of education of administrators of public sector organizations may have given rise to the strong resistance to change in favour of ICTs utilization [17].

All these environmental, behavioral, and cultural factors hamper and may negatively affect the successful utilization of ICTs and the ultimate implementation of ERPs in the Ghanaian public sector.

2) Literacy levels and Competencies needed for ICT operationalization in Organizations.

The competencies and levels of computer literacy needed by individuals who manage organizations in the 21st Century are varied. Digital literacy and competence of an individual requires leveraging his own knowledge of the specific field managed with an exhibition of IT skills set acquired through education and training [8][15]. Learning of the software application and hardware manipulation relative to the services being rendered by an organization is a key component of ICT literacy [22]. It is believed that ICT competency must be assessed based on knowledge, skills and attitude of employees who adapt and utilize them [8]. These three components must be associated with use of specific hard ware technology, use of application software in the organizational context and being able to collaborate with all stakeholders within that knowledge community [15][19].

The ability of management and personnel to deploy and utilize new ICT tools to analyze and evaluate information and solve work related problems also provides a yard stick for measuring organizational performance, growth and development [7][13]. The ability of managers to effectively deploy ICTs tools within complex organizational settings and frameworks showcases the technological, cognitive and social skill set necessary for effectiveness in an ICT driven work environment [11]. These notwithstanding, constant tutoring, training and certification in ICT education is necessary for keeping up with the constantly evolving ICT paradigms [17].

ICT competencies and skills set in effect border on the following:

- Education, training and proficiency in ICT hardware and software utilization [8]

- Knowledge and management of organizational data using ICT tools [14]

- Use of ICT competency skills to solve organizational problems [11]

- Adaptability to ICT environments with sustainable upgrade and scalability [17]

- Collaborative Information Systems communication with external organizations with stakeholder integration [12]

III. MATERIALS AND METHODS

A. *The Target Population and Study Sample*

This study adopted a research design approach that was quantitative in nature with a qualitative review of secondary data in the form of reports from the various Local Government Organizations in Ashanti Region. The research therefore probes the issues of the literacy and competency levels of project personnel at the Metropolitan, Municipal and District Assembly level (MMDAs). Structured and close ended questionnaires were self-administered at the various selected local government organizations and to purposively sampled personnel that administer projects in the sampled organizations.

The Local Government Organogram provides the linkages between the Regional Coordinating Council and the MMDAs and this is shown in Figure 1.
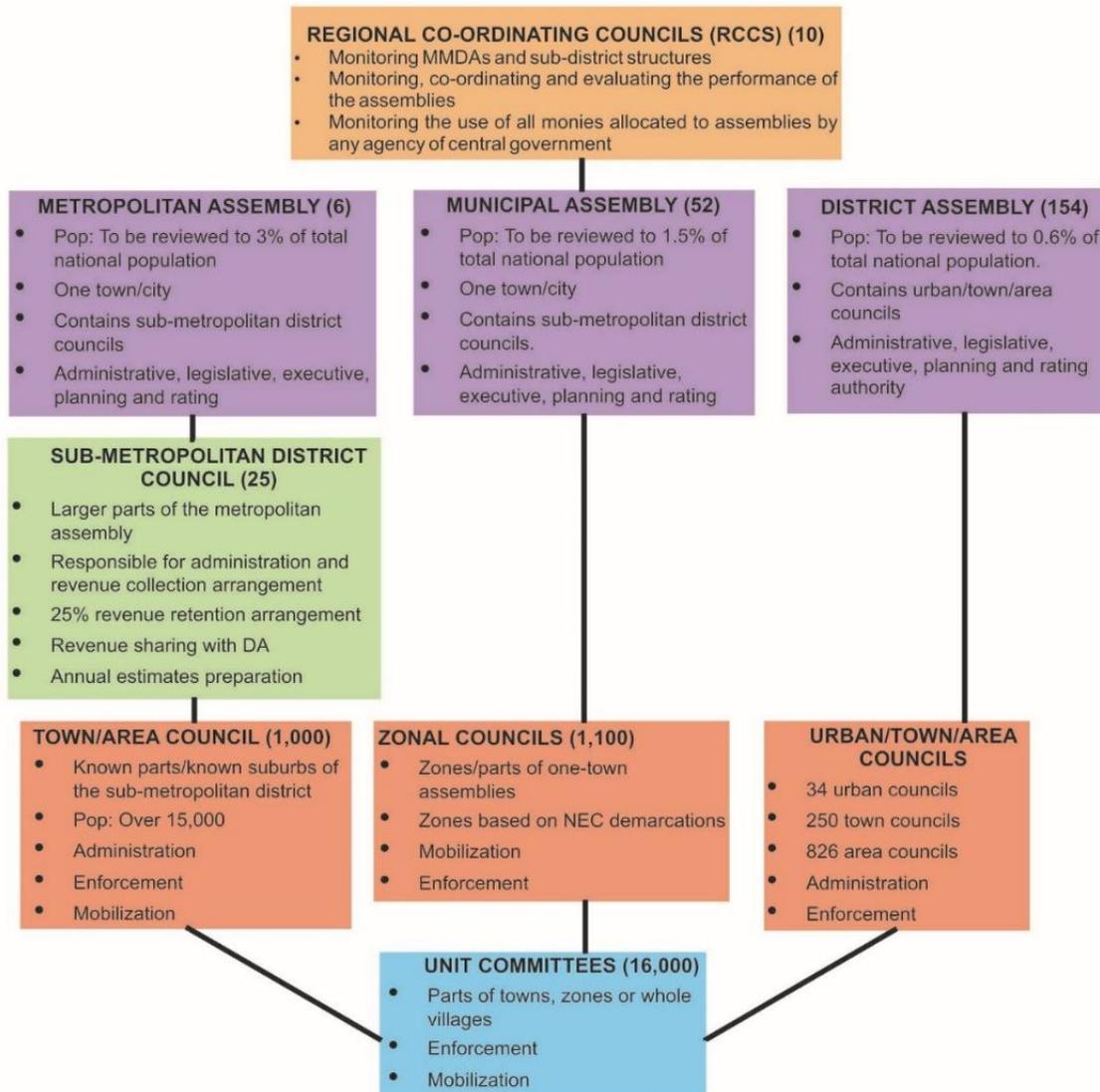
Figure 1.   Five (5) Tier Local Government System. Source: Local Government Directorate, 2013 (Modified by author).

In order to analyze the data gathered, the Chi-square Goodness of Fit Test was used to assess the ICT literacy and competency levels of project management personnel in the selected assemblies. This method of analysis was carefully chosen because it provides the basis for hypothesis testing.

B. The Chi-square Goodness of Fit Test

The Chi-square test is also known as the Pearson Chi-square test and commonly used in the testing of hypotheses. The test used in this paper provides information on the differences between the expected and observed data in the identified categories which sums up the ICT competency level of personnel involved in project management.

The closer the agreement between the observed and expected values, the smaller will be the critical value of χ2. A value of zero indicates perfect agreement.

The formula for calculating the Chi-square: Goodness of Fit Test is seen below:

$$\chi^2 = \sum_i \frac{(O_i - E_i)^2}{E_i}$$

Where:

O = Observed Value

E = Expected Value

χ^2 = The Chi-square Test Statistic

Df=Degree of Freedom(R-1) (C-1); R is number of rows in table, C is number of columns.

The computation of the two values for comparison namely the Test Statistic(χ^2) and the Critical Value (CV) from

Contingency Tables at a Level of Significance (α) of 0.05 will enable us accept or reject the hypothesis, once the degree of freedom (Df) is calculated.

The hypothesis formulated for this research is:

H0: Assumes that there is no significant difference between the expected and observed values relating to the ICT Competency levels of project management personnel at the MMDAs.

H1: Assumes that there is a significant difference between the expected and observed values relating to the ICT Competency levels of project management personnel at the MMDAs.

In order to properly asses the ICT competence of project management teams within the MMDAs, the questionnaires handed out were sectioned into key competency factors being investigated. Hence for each key variable or factor the Chi-square Goodness of Fit test is calculated. This would ensure specificity in the results from the various persons within the MMDAs.

IV.   ANALYSIS AND DISCUSSION OF DATA

A. Analysis of Respondents Biodata

The characteristics of the respondent's organization involved in this research is not a key concern in this study, although it is important to discuss the basic background information of the 105 persons interviewed especially in terms of their rank at the assembly amongst others. Data was therefore collected based on these characteristics. The Table 1 represents a summary of the characteristics of respondents selected for the study.

This Table shows that in terms of education, about 82.9% of the respondents of the organization were mostly 2nd degree holders whilst 14.3 % were first degree holders. It is observed from Table 1. that in terms of working experience only 5.7% of the respondents of the institutions had below five years working experience, 40% had between 6 to 15 years working experience, 48.6% had between 16 to 24 years working experience whilst 5.7% had 25 years and above working experience. The data indicated that majority (70.5) of the organizations studied were District Assemblies. Furthermore, 23.8% were Municipal Assemblies, and 2.85% which represents one (1) Metropolitan Assembly as well as well as one (1) Regional Coordinating Council. The inference drawn from the demographic data indicated that a vast majority of the main actors employed to manage the assembly and by extension undertake the project management processes were literate and knowledgeable, very well educated at least to the tertiary level, are professionals and are appropriately placed to function in their respective capacities.

TABLE I.   CHARACTERISTICS OF RESPONDENTS IN LOCAL GOVERNMENT ORGANIZATIONS (MMDAS)

Variables	Category	Freq.	Percent
Educational level	1st degree	15	14.3
	2nd degree	87	82.9
	Others	3	2.9
	Total	105	100.0
Work Experience	Below 5 years	6	5.7
	6-15 years	42	40.0
	16-24 years	51	48.6
	25 years and above	6	5.7
	Total	105	100.0
Class of Assembly	District Assembly	74	70.5
	Municipal Assembly	25	23.8
	Metropolitan Assembly	3	2.85
	RCC	3	2.85
	Total	105	100.0
Job Title of Respondents	District Coordinating Director	60	57.14
	Planning Officer	18	17.14
	Assistant HR	3	2.86
	Budget Officer	3	2.86
	ICT Officer	6	5.71
	Engineer	9	8.57
	District Quantity Surveyor	3	2.86
	Technical Officer	3	2.86
	Total	105	100

Source: Author's Construct, 2016.

B. ICT Competency Levels of Project Management Personnel

The requirement for ICT competency was level of ICT literacy of project management team members including the executive management team which is directly responsible for coordination of all projects within the districts at the regional level.

The hypothesis developed to be tested:

H_0: Assumes that there are no significant differences between the expected and observed data collected on ICT literacy and competence levels of project management personnel at the MMDAs.

H_1: Assumes that there are significant differences between the expected and observed data collected on ICT literacy and competence levels of project management personnel at the MMDAs.

TABLE II. CHI-SQUARE TABLE SHOWING ICT COMPETENCIES OF EXECUTIVE MANAGEMENT AND PROJECT MANAGEMENT PERSONNEL AT THE MMDAs

	ICT Competency Indicators at the MMDAs	Yes	No	Observed (%)	Expected (%)	$(O-E)^2/E$
1	ICT-Trained Executive Management Personnel	0	100	0	100	100
2	ICT-Trained Project Management Personnel	0	100	0	100	100
3	Personnel in organization have ICT expertise in Project Data Collection, Management and Information Sharing	20	80	20	100	64
4	Organization has ICT Project Data Audits, Reporting and Data Transmission Competency	20	80	20	100	64
5	Awareness of Project Management Information Systems (PMIS)	50	50	50	100	25
6	Training in PMIS programme	10	90	10	100	81
	Mean	16.6	83.3	16.6	100	
	Test Statistic (χ^2)=$\sum$					434
	Critical Value from Tables					11.071
	Degree of Freedom	(2-1) x (6-1) = 5				
	Level of significance (α)	0.05				

The responses in Table 2 indicate that 100 out of 105 questionnaires administered were returned giving researchers a 95% return rate. The results indicated that the project management teams do not also have any formal training regarding the operationalization of ICT systems within the MMDAs.

Given the Degree of Freedom (Df=5) and the Level of Significance (α) as 0.05, the test Statistic (χ^2) for the "Chi-Goodness of Fit Test" as calculated was 11.07(Expected Value). As deduced, the Observed Value 434 > 11.07, which is the critical value (CV). This requires that we REJECT THE NULL HYPOTHESIS, whilst ACCEPTING THE ALTERNATIVE HYPOTHESIS:

H_1: which indicates that there are significant differences between the expected and observed data collected on ICT literacy and competence levels of project management personnel at the MMDAs.

This data and analysis clearly indicate that the MMDAs have executive management and project management staff that may not have the competencies and adequate ICT literacy levels to run a paperless Project Management Information System or an ERP driven organization. The differences shown in the computation of the mean values between the expected data (100) and the observed (16.6) is huge. Since the issue of ICT competency is a critical key variable for the operationalization of ERPs and Project Management Information Systems, any Local Government roll out of a paperless system across these organizations will require some extensive training to bridge the knowledge gap.

The results from the Table 2 may be interpreted to mean that Local Government Organizations involved in this study are most likely to have Project Management execution Units with Project Management personnel who have basic skills in ICTs and are likely to be aware of ICT tools for Project Management. However, the Local Governments institutions most likely do not provide in-service training on Project Management and ICT applications for Project Management personnel.

Secondary data also corroborates the fact that all the Local Governments Organizations studied did not provide in-service training on ICTs application, deployment and utilization for their Project Management personnel. Though the Project Management personnel have basic IT skills, they do not have the expertise to apply ICT tools in managing projects. This could partly be attributed to the findings that ICT utilization in these organizations is minimal and invariably most of the activities that ICTs could enhance are still done manually. In effect since ICT is not much utilized in these organizations, little effort is made to develop ICT expertise of staff.

Unfortunately, the Government of Ghana has no policy to ensure that personnel in these establishments are trained specifically in ICTs for projects as well as Project Management Information Systems and processes.

V. CONCLUSIONS AND RECOMMENDATIONS

It is observed from the study that the Government of Ghana still has a long way to go before it reaches that paperless and digital future in the management of our projects. Local government personnel who form a vital part of the success of any project implementation process are currently not trained or ready to use any ICT systems that would be introduced. The study indicates some project management personnel possess some basic ICT skills but lack the requisite ICT knowledge and competency necessary for the successful delivery and management of project. This deficit needs to be addressed if ICTs are to be integrated into the LGOs for project execution and management.

Additionally, training in all skills necessary for project implementation and management at the Local Government

level is lacking. Training programs and skills upgrade exercises are recommended. The provision of avenues for training of all staff in new ICT skills in all facets of the operations of Local Government including Project Management Information Systems from initiation, planning, execution, monitoring, control through closure is recommended. To be able meet international standards and remain competitive in the digital delivery of projects undertaken by government all personnel and human capital need to be developed in our Local Government Organizations. We are to bear in mind that competent management skills of personnel lead to increased productivity and consequently positive project outcomes. The recommendations for improvements if adhered to will create the right framework for projects to be delivered on value for money bases and subsequently save the tax payer unnecessary, uncontrolled, unbudgeted-for expenditure.

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