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Effective Use Of Information Technology for Performance Management In Zambian Government Institutions *

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Abstract— *The literature reviewed suggests that, much as the concept of performance management systems has been in existence for a long period of time, as early as 1980s, it is only in the early 2000s that organizations begun to reap the benefits of implementing such systems. With Norton and Kaplan invention of the balanced scorecard (Kaplan R, 2010) organizations started to base performance by considering many aspects that constitutes performance of an organization such as Financials, Internal business processes, customer service and people management. Use of these performance parameters would assess both individual and business performance as a whole.*

Literature suggests that integrating Information technology into business processes for example, Enterprise Resource Planning (ERP) systems, Supply chain Management systems (SCM) and Inventory management, overlooking modernizing people management systems like performance management, could be a misdirected investment. This form of IT implementations in many public institutions and indeed privately owned entities has not yielded expected results. This is because regardless of how good a technology might be and how huge the investment could be, if the people working on such IT systems are not efficient, the business cannot be productive, and therefore, the efficiency of any IT system can only yield results when there is a high level of efficiency from people using such systems.

Keywords—*Perfomance Management System; Government institutions; Information systems; Scorecards; Efficiency; Web* Application.

I. INTRODUCTION

Chapter 1 looks at the project scope, problem statement; being the basis for undertaking the project, the approach to be used and the ultimate outcome as a result of undertaking the project.

A. Scope

As the world advances with the increased use of Information Technology and new discoveries; governments and businesses alike have also kept evolving in the way they operate and conduct business, this is in order to fit in the global village and therefore, increase efficiency, remain competitive and also raise levels of production. It is interesting to note that in the last three years the world over has recorded a rapid increase as regards use of Technology and there has also been a significant increase in innovations especially in mobile computing. Suffice to say, despite all these developments, third world countries' have remained poor, productivity especially among public workers still remains low and levels of efficiency have also been low to sustain government , a situation that requires urgent intervention. Use of information systems such as ERP tools have to a greater extent helped to improve internal business processes,

however, this has not been able to improve efficiency levels of workers and therefore rendering poor performance especially in public service.

In order to change the poor working culture in public institutions especially in third world countries, it is important that institutions such as government realizes the importance of Information Technology and how they can leverage on the use of information systems to help improve efficiency, productivity and service delivery and in turn accelerate economic development.

Performance management is one of the effective systems business entities use to improve efficiency levels and productivity of its workers and the same can be applied in government institutions.

B. *Background*

According to Brignall *etal* (2000), use of performance management tools has in the recent past received a lot of coverage both in private and public sectors alike. Brignall *etal* (2000), further explains that companies competitiveness, no longer depends much on cost and price, rather, the focus is on the development of multidimensional performance measurement models (Brignall,2000) which are regarded as efficient tools used to measure organizational performance. These models are more inclined to non-financial information, which is aimed at meeting the needs of all stakeholders such as employees and customers. This is in contrast with old financial-oriented business measurement methods and techniques which were more focused on meeting shareholder needs. Brignall *etal* (2000) reports that as results of such developments, advanced countries like the United Kingdom and Scandinavia came under pressure to become effective and efficient in its business operations whilst placing more emphasis on maintaining the quality of services provided to the public, and ultimately reduce dependence on tax payers.

Koufteros *etal* (2014) reviews three performance management system models and discusses how each impacts the performance of an organization. The information provided, brings out each system's capabilities and how each model impacts performance of an organization at operations level, strategic level and the organization as a whole. The diagnostic performance management technique looks at operational processes in terms of reporting, performance monitoring systems and communication of performance results and this systems is implemented at operations level. Further, Koufteros *etal* (2014), reports on the interactive performance management system, which is implemented at the strategic level to stimulate creativity and innovation in the organization and increasing interaction and information sharing between senior managers and executives. It is however, emphasized that a dynamic tension performance management system (Koufteros *etal*, 2014), which is a combination of the two performance management systems be considered as an ideal system for increased organization success. For an organization to remain competitive, it is important that whatever is being done by the top executives is replicated to the operations; this type of synergy is likely to lead into an efficient and productive organization.

C. *Problem Statement*

Zambia's progress towards management of its economy has been slow, with a total area of 752,614 Km² only 5% of arable land has been utilized (CIA fact book, 2014) meaning 95% of is the land still remains unused. While it is true that the government has employed over 60% of the total number of workers, the economy continues to dance back and forth with its currency weakening due to unstable economy. The performance of every country's economy and companies largely starts with the workforce and management processes. An efficient workforce supported by information

technology has the ability to lead any organization to productivity.

Like many other developing countries, Zambia finances its economy from taxes collected from workers and other business units, which is also the case across many countries in Africa. For many years Zambia has been struggling to develop, yet there is abundant natural resources. The major contributing factors to poor economic performance can be alluded to underperformance and poor work culture exhibited in public service. Many public workers fail to fully apply themselves and show commitment with their work because of job security that comes with government jobs, lack of clear objectives of what is expected of them when they report for work and thus affecting productivity and quality of services provided to the public, who are the tax payers.

Therefore, if Zambia is to develop, the work culture amongst public workers needs transformation, people must learn to have sense of ownership, show commitment and also be able to earn their income through clearly stated and tracked performance systems. It should be noted that, Zambia is a liberalized economy and as such the government may not be able to compete with the private sector and therefore in order to ensure prudent use of public resources and therefore improve operations, efficiency and productivity; it is important that the government adopts systems that can hold its workers accountable for the committed resources. This has potential to improve service delivery as well as raising the integrity of government operations as people are made to be accountable all the time. Information technology systems have capacity to speed up organizational work flow processes and ultimately improve efficiency.

II. Analysis and Design

This chapter aims to investigate use of performance management systems in public institutions in Zambia through use of available research methodologies. Various methodologies exist to aid information gathering, on the type of methodology used is sole dependent on the preference by the researcher and the type of problem being investigated. The researcher considered available information gathering techniques and methodologies such as the Delphi-technique (Davidson, 2013), quantitative and qualitative methods, regression analysis, Quassi-Experimental (Gough, 2014) and meta-analysis. However, the qualitative (Aleca etal, 2009) methodology was adopted and regarded as the most appropriate technique for information gathering requirements for the system being investigated. The qualitative technique necessitated production of survey questions (Riedl etal, 2014) to help solicit for information from Zambian public workers on the use of performance management systems, systems effectiveness and IT integration in such systems.

A. *Methodology*

A survey was conducted to investigate use of performance management system in public institutions in Zambia and the survey instrument was designed using sogosurvey.com development tools as shown in figure 1:

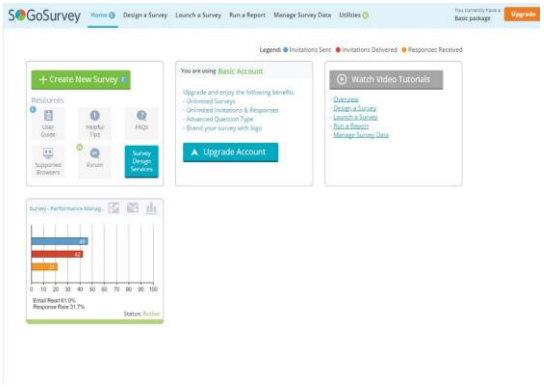

Figure 1. Snapshot of sogoSurvey.com website

In order implement this project, it was necessary to gather enough information on the subject of

performance management systems, their use in public institutions and how such systems could be supported by information technology to enhance performance and efficiency in public institutions. A two-phased approach was used to acquire enough knowledge about the subject and also investigate available performance management systems in public institution through literature search and review and conduct of a survey.

The first set of questionnaires developed was piloted to 2 respondents within the writer's place and questionnaires to one of the target groups (the government ministries) for feedback and the following are the observations which were made:

Out of the 10 questionnaires distributed online, only 3 participants responded

Feedback received from participants indicated that the subject of performance management was relatively new and was confused with performance appraisals. Since some participants were skeptical using online questionnaires, a provision for printed questionnaires was made to allow for more participation. A decision was made to distribute 150 printed questionnaires and 45 online and also interview selected individuals in addition to responding to printed questionnaires

B. Results Obtained From the survey

Of the 115 survey participants, 80.9% opted to use printed survey questionnaires, 18.3% online and 0.87% face-to-face interviews (figure 2 and table 1). This served as an indicator on the type systems being used in public institutions and also reviewed that in coming up with an IT supported performance management system, it is important to take such into consideration to ensure acceptance.

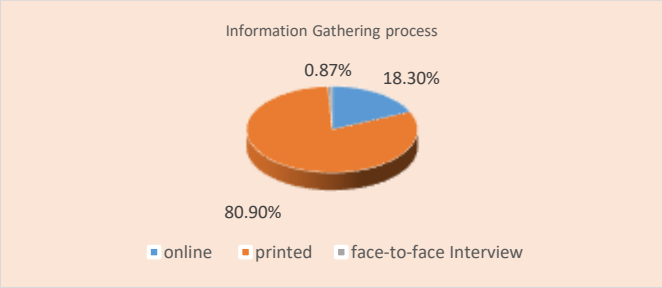

Figure 2. Information gathering process

online	printed	face-to-face Interview
18.30%	80.90%	0.87%
21	93	1

Table 1 Information Gathering by Percentage

On the question concerning availability of a performance management system in public institutions, 56.5% of the respondents agreed that performance management systems existed in public institutions, 33.3% disagreed that such systems do not exist whilst 12.2% were not sure whether these systems are available. The figure 3 shows the graphical representation of the results obtained.

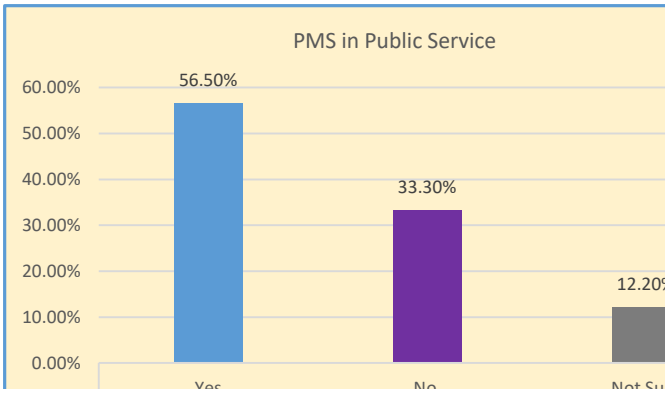

Figure 3. Performance management system availability in public service

C. Development Methodology

Arising from the results of the survey, and the understanding that current systems cannot assure efficiency and productivity in Zambian public institutions based on the responses received, this section looks at a possible software design model

that can be implemented to support synergy in the way government institutions operates.

The prototype development approach will be used to come up with a proposed performance management model for public institutions. Due to the complexities that exists in public institutions, it is important that the proposed system is subjected to a number of system prototypes. The proposed design for the performance management system is required to have three core components, the client-side, server-side and the messaging system.

D. Development tools and Requirements

The prototype is not resource demanding and as such, any computer or laptop with a minimum of 1GB of RAM, 40GB Hard disk space would still support the application, the developer used a windows platform to develop the application, it should however, be noted that PHP is platform independent and can run on a number of available operating systems including Linux. Detailed below are the tools used to develop the application.

- EasyPHP

  This is a WAMP package that contains server-Side Scripting language PHP, Apache webserver, SQL MySQL server and the database manager phpMyAdmin. Due to its portability, the tool was considered more appropriate to develop the application.

- Dreamweaver

  An Adobe web development application, has rich features that support a number of languages including PHP, CSS, JavaScript (for Client Side Scripting), HTML, XHTML, ASP Action, ASP.net, java and many was considered an appropriate as it support many languages and web content.

E. System Design

The design model took into consideration routine operations in public institutions and the reporting matrix. And therefore, the assumptions made are that the managers include senior managers, line managers and operations managers are responsible for ensuring that members that they lead perform and to the expectations.

Critical to the success of the proposed IT performance management system is that every member should be accountable and also contribute to the performance expectations. And therefore, each employee should have access to the performance management system and report on work progress in line with their own individual targets as well as department expectations.

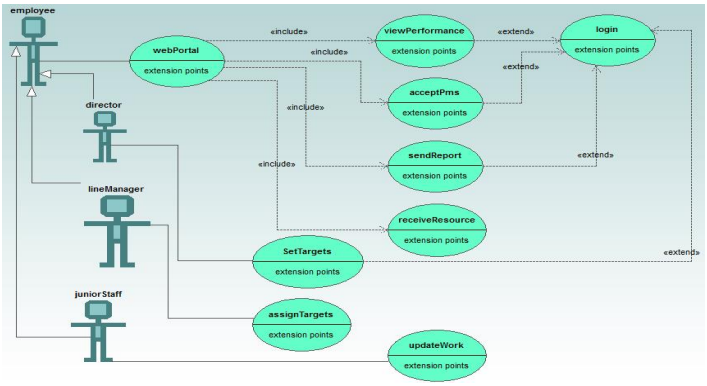

Figure 4. design model for the proposed system

F. Design Implimentation

The design of the performance management had three core components; the main portal which contained all information about performance management system, communications portal and the MySQL database. The performance management systems portal is as shown below in figure 5

Figure 5. Performance management systems portal

III. Results and Evaluation

From both the online and printed survey questionnaires, it was discovered that from the 117 participants, 56.5% respondents reported availability of performance management systems, 33.3% reported non availability of such systems while 12% were not sure. For an effective performance management system, Chiu, etal (2014), reports that people's involvement, behavior, and altitude towards accepting an innovation is very important. Moving along with the argument, it is impractical to create a productive environment when drivers are not involved or not sure of what it is they are using or working with. Therefore, the results obtained from the survey clearly indicates non availability of effective performance management systems considering the disparities in the number of responses received. The results obtained were a combination of participants working in different positions (senior Management, management up to the lowest level). This was to allow for a broader understanding of existing systems and to test understanding of performance management systems amongst public workers. The surveys also reviewed that in most cases, appraisals systems were confused with performance management systems, to which customized trainings lasting for 10 – 15 minutes was conducted in some instances to ensure that participants understood the requirements of the questionnaires.

To probe further on the effectiveness of existing performance management systems, respondents were requested to rate their respective performance management systems. Respondents who said the current systems were very good scored 4.8%, good scored 14.3%, 28.6% said the systems were fair while 38.1% and 14.3% stated that the current systems were poor and very poor, respectively.

Figure 6 represents the results obtained and table 5 shows raw data and the percentages.

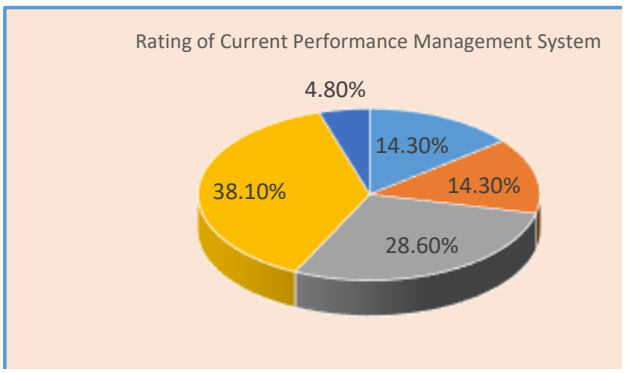

Figure 6. Rating of existing performance management systems

very good	good	fair	poor	very poor
16	16	33	44	6
14.30%	14.30%	28.60%	38.10%	4.80%

Table 2 performance management rating

Of critical importance to the investigation was how an IT supported performance management would improve efficiency and productivity, therefore, respondents were required to rate how such an implementation can assist in transforming the work culture in public service. From the responses, 42.9% strongly agreed that such as a system can help improve performance, 33.3% agreed that efficiency and productivity would improve and 9.5% fairly agreed while 9.5 were not sure. However, 4.8% disagreed that such a system would not improve performance. The result

obtained reviewed that over 70% of respondents are in support of an IT supported performance management system and are of the view that implementing such a system would improve worker efficiency and productivity. Figure 7 is a representation of the results obtained from rating the extent to which an IT supported performance management system would improve efficiency and productivity.to further solicit for more feedback from respondents, a provision was made to allow them to give general feedback regarding use of performance management systems.

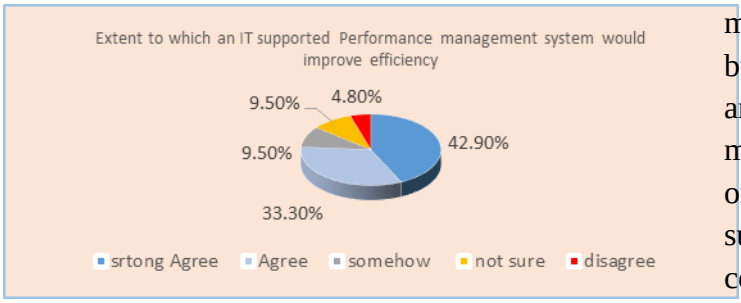

Figure 7. Rating of an IT supported performance management system

IV. Discussion

The way public institutions operate in Zambia reviewed that no systematic performance management systems exist, or rather an effective system in place to support efficiency and productivity and consequently affecting service delivery and economic growth.

The results obtained from the survey indicates that each ministry may have one or more systems in use for managing performance making it difficult to manage workers. Another interesting part is that even when workers are appraised, no remedial action is taken to help improve worker performance or productivity neither is there a measure to show how much each worker has contributed to the overall performance of a government unit. It is therefore important that there is a standard way of managing performance of workers and organizations to guarantee productivity and efficiency. Information systems have proved significance in processes unification and can help with efficient management of public resources. It is imperative that workers are paid based on their contribution towards achievement of set goals and objectives. Having a system that allows for automated allocation of tasks ensures that everyone is able to show accountability and thus assure that public resources are put to good use.

Wendell (2014) describes performance management as a system that integrates familiar business methodologies with technology. A lot of articles have been published on performance management systems, though there is little coverage on the application of information technology to such systems. Wendell (2014), reports that companies and organizations have invested huge sums of money into ERP systems to automate business processes. He however, argues that these operational and transaction based IT systems, for example; ERP, CRM and SCM systems have at the most, only helped to improve routine business functions and to a greater extent could be a distracted investment. Moving the argument along, there are a number of institutions that have implemented very expensive IT systems but have not been able to realize the true value from their investment, this entails that systems do not get the job done but application of well managed skills with the support of Technology, in this case an IT supported performance management system. In addition, with the speed at which technology is advancing, company executives should put as top priority IT solutions for managing their human capital. IT supported performance management system (ISPMS) plus operational and transaction based systems are a complete set of business information systems required to make any business to operate efficiently and utilize its IT resources cost effectively and profitably. Due to the competitive nature of business entities especially in

the private sector, a number of performance management systems have been developed and now the focus is on recruiting people that have the required skills to efficiently fit in their business strategies to help them meet business goals and remain competitive.

A. *Need For Perfomance Management Systems*

Business processes design and Technology are a core foundation of performance management systems (Angelita etal, 2014). Organizations that have top executives as champions of performance management systems (Angelita etal, 2014) have adequately benefited from other Information systems (ERP, SCM, CRM alike) and their businesses have correspondingly recorded a lot of success. This is something that should be replicated in public institutions to ensure that there is efficiency and productivity in these institutions.

For improved performance and productivity, it is important that before deciding on the implementation of ERP tools, the workforce is well prepared by having them aligned to the organization strategy. It should however, be emphasized that the best tools available for aligning workers to the company vision and mission is through implementation of an IT supported performance management system. Performance management systems enhance organizational communication (Patricia etal, 2014), help organizations to align systems in order to obtain desirable behaviors, create an environment where everyone is accountable for their actions and also plays a role in skills development, these are the benefits public institutions can leverage on to competitively position their public business operations.

B. *Perfomance Management and IT Intergration*

As Melville etal, (2004) puts it, Information Technology enables industries to capture a substantive amount of value from their businesses. A demonstration of how IT tools have helped in transforming businesses and increase competitiveness as well as improving efficiency and productivity, lies in the systems design models and their ability to mimic manual processes efficiently and cost effectively. Integration of Information Technology into performance management systems demands that a study of business processes and other factors such as culture, behavior, internal and external environmental factors (Bititci etal, 1997) are put into consideration. (Bititci etal, 1997) suggests that Structure and configuration of the performance measurement system becomes critical to the efficiency and effectiveness of the Performance management process", this becomes even more critical in complex institutions such as state owned enterprises as well as public institution. Bititci etal, (1997) further highlights performance management processes as shown in figure 8, providing necessary information required in the design of performance management systems.

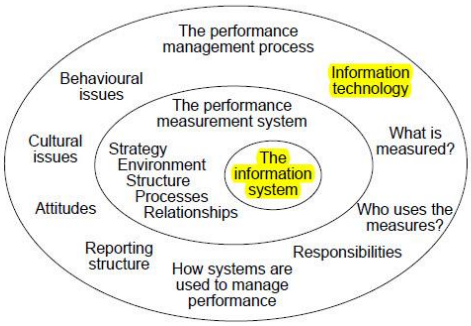

Figure 8.Performance management processes

Bititci etal, (1997) identifies Integrity of the performance management system and deployment as two critical design considerations and lists four critical levels of a performance management system such as Corporate, Business units, Business process and activities as being fundamental for a viable system. Further, five system concepts were identified such as system amplification which looks at objectives from higher levels to lower levels of the system, Transduction (Bititci etal, 1997),

that is deployment of higher level business objectives to lower levels, attenuation which looks at the communication process from the lower levels upwards and recursion to take care of the repetitive aspect of the systems thinking (Bititci etal, 1997). Similar to such an implementation was a web based performance management also presented by Bititci etal, (2014), the system provided an interface between business processes and numerical data. The numerical data which was fed into the WePMS (Bititci etal, 2014) was obtained from other sources such as spreadsheets, databases and ERP systems. The strength of this design was that data from different business systems is presented to the quality analysis system which then aggregates the results which are then presented on the web page. It should however, be noted that human interaction with the system is not clearly defined, if the target is to improve worker performance, more emphasis should be placed on how workers interacts with the system, this model lays a good foundation for developing a high worker productivity centered system as opposed to the WePMS which focuses more on efficiency of business processes and partially fulfills human resource performance.

V. Conclusion

Having analyzed the results and implemented a prototype application for the IT supported performance management system for Zambian public institutions, chapter 6 highlights the lessons learnt and knowledge acquired as a result of conducting the research, originality and the limitations of the project. The chapter also looks at the business application and the limitations of the project. In concluding the chapter, a recommendation is made on the future direction and prospects for future research on the work carried out.

A. Lessons Learned

Use of information systems and technology has transformed the world in many aspects, and we have seen its wider application in almost all professional fields. As part of lessons learnt from undertaking the project, the research reviewed how information systems and technology is impacting business processes in the world and its impact on systems such as performance management systems.

The research reviewed that information systems have played a pivotal role in transforming organizations in every business aspect. Web technologies have the ability to implement systems that imitate manual process and yet provide accurate results. It was learnt that understanding requirements for a systems requires a lot of effort and in order to implement a system that meets business requirements and therefore meets user requirements, it is important to plan how to collect information and have an understanding of the methodology for processing that information.

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REFERENCES

[1] Aleca, O, Mihai, F, Stanciu, A, & Vrîncianu, M 2009, 'Research Methodologies for Management Information in Romania', *Theoretical & Applied Economics*, 16, 4, pp. 75-80, Business Source Complete, EBSCO*host*, viewed 14 December 2015.

[2] BENTO, A, BENTO, R, & FERREIRA WHITE, L 2014, 'STRATEGIC PERFORMANCE MANAGEMENT SYSTEMS: IMPACT ON BUSINESS RESULTS', *Journal Of Computer Information Systems*, 54, 3, pp. 25-33, Business Source Complete, EBSCO*host*, viewed 24 December 2015.

[3] Bititci, U, Carrie, A, & McDevitt, L 1997, 'Integrated performance measurement systems: a development guide', *International Journal Of Operations & Production Management*, 17, 5, pp. 522-534, Business Source Complete, EBSCO*host*, viewed 7 December 2015.

[4] Christopher J. Wells TechnologyUK, Web Server Scripting - A Multi-User Login Cooke, F, & Huang, K 2011, 'Post acquisition evolution of the appraisal and reward systems: A study of Chinese IT firms acquired by US firms', *Human Resource Management*, 50, 6, pp. 839-858, CINAHL Plus, EBSCO*host*, viewed 2 December 2015.

[5] Davidson, PL 2013, 'THE DELPHI TECHNIQUE IN DOCTORAL RESEARCH: CONSIDERATIONS AND RATIONALE', *Review Of Higher Education & Self-Learning*, 6, 22, pp. 53-65, Education Research Complete, EBSCO*host*, viewed 14 December 2015.

[6] Demartini, C, & Mella, P 2014, 'Beyond feedback control: The interactive use of performance management systems. Implications for process innovation in Italian healthcare organizations', *International Journal Of Health Planning And Management*, 29, 1, p. e1-e30, Scopus®, EBSCO*host*, viewed 30 December 2015.

[7] Fu, N 2013, 'Exploring the impact of high performance work systems in professional service firms: A practices-resources-uses-performance approach', *Consulting Psychology Journal: Practice And Research*, 65, 3, pp. 240-257, PsycARTICLES, EBSCO*host*, viewed 2 December 2015.

[8] Geerken, M, & Peters, B 2005, 'Automation, Integration and Performance-Based Management at the Orleans Parish Criminal Sheriff's Office', *Corrections Today*, 67, 4, pp. 70-77, National Criminal Justice Reference Service Abstracts, EBSCO*host*, viewed 8 Decemberr 2015.

[9] Gimzauskiene, E, & Kloviene, L 2011, 'Performance Measurement System: Towards an Institutional Theory', *Engineering Economics*, 22, 4, pp. 338-344, Business Source Complete, EBSCO*host*, viewed 8 December 2015.

[10] Gough, N 2014, 'Research Methodologies Represented (or Not) in AJEE', *Australian Journal Of Environmental Education*, 30, 1, pp. 64-0067, Education Research Complete, EBSCO*host*, viewed 14 December 2015.http://dx.doi.org/10.1108/01443570210450310

[11] Jha, NK 2008, *Research Methodology [Electronic Book] N.K. Jha*, n.p.: Chandigarh [India] : Abhishek Publications, 2008., University of Liverpool Catalogue, EBSCO*host*, viewed 14 December 2015

[12] Kaplan, R.S. (1), D.P. (2) Norton, and B. (3) Rugelsjoen. 2010. "Managing alliances with the balanced scorecard." *Harvard Business Review* 88, no. 1-2: *Scopus®*, EBSCO*host*.

[13] LIU, W, GUTHRIE, J, FLOOD, P, & MACCURTAIN, S 2009, 'UNIONS AND THE ADOPTION OF HIGH PERFORMANCE WORK SYSTEMS: DOES EMPLOYMENT SECURITY PLAY A ROLE?', *Industrial & Labor Relations Review*, 63, 1, pp. 109-127, Business Source Complete, EBSCO*host*.

[14] Macris, L, & Sam, M 2014, 'Belief, Doubt, and Legitimacy in a Performance System: National Sport Organization Perspectives', *Journal Of Sport Management*, 28, 5, pp. 529-550, SPORTDiscus with Full Text, EBSCO*host*, viewed 30 December 2015.

[15] Magni, M, Angst, C, & Agarwal, R 2012, 'Everybody Needs Somebody: The Influence of Team Network Structure on Information Technology Use', *Journal Of Management Information Systems*, 29, 3, pp. 9-42, Business Source Complete, EBSCO*host*, viewed 24 December 2015.

[16] Mansor, M, & Tayib, M 2013, 'Integrated and Open Systems Model: An Innovative Approach to Tax Administration Performance Management', *Innovation Journal*, 18, 3, pp. 1-29, Business Source Complete, EBSCO*host*, viewed 30 December 2015.

[17] Mansour, R, & Thorne, M 2014, 'Performance management fundamentals', *Health Management Technology*, 35, 9, pp. 16-17, Business Source Complete, EBSCO*host*, viewed 8 December 2015.

[18] Melville, N, Kraemer, K, & Gurbaxani, V 2004, 'INFORMATION TECHNOLOGY AND ORGANIZATIONAL PERFORMANCE: AN INTEGRATIVE MODEL OF IT BUSINESS VALUE', *MIS Quarterly*, 28, 2, pp. 283-322, Business Source Complete, EBSCO*host*, viewed 7 December 2015.

[19] Messersmith, J, & Guthrie, J 2010, 'High performance work systems in emergent organizations: Implications for firm performance', *Human Resource Management*, 49, 2, pp. 241-264, Business Source Complete, EBSCO*host*, viewed 30 December 2015.

[20] Mithas, S, Ramasubbu, N, & Sambamurthy, V 2011, 'HOW INFORMATION MANAGEMENT CAPABILITY INFLUENCES FIRM PERFORMANCE', *MIS Quarterly*, 35, 1, pp. 237-256, Business Source Complete, EBSCO*host*, viewed 24 December 2015.

[21] Nudurupati, S, Bititci, U, Kumar, V, & Chan, F 2011, 'State of the art literature review on performance measurement', *Computers & Industrial Engineering*, 60, 2, pp. 279-290, Business Source Complete, EBSCO*host*, viewed 8 December 2015.

[22] Parthiban, P, & Abdul Zubar, H 2013, 'An integrated multi-objective decision making process for the performance evaluation of the vendors', *International Journal Of Production Research*, 51, 13, pp. 3836-3848, Business Source Complete, EBSCO*host*, viewed 30 December 2015.

[23] PATRICIA DAVIS, ROBERT W. ROGERS 2014. . [ONLINE] Available at: http://www.ddiworld.com/ddiworld/media/white-papers/gettingthemost_wp_ddi.pdf. [Accessed 30 December 2015].