

**ICSS 2019-124 Paper (Revised)****Monitoring and evaluation in a chaotic and complex government interventions' environment****Prof Dominique E Uwizeyimana**

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Email: [dominiqueu@uj.ac.za](mailto:dominiqueu@uj.ac.za)<https://orcid.org/0000-0001-8062-5075>**ABSTRACT**

*This paper analyses the factors that influence Monitoring and Evaluation (M&E) of government interventions in a chaotic and complex organisational environment. The central argument is that many factors from the natural and man-made (intellectual) environment affect the evaluation of government interventions. However, despite approximately three decades of M&E studies, there is currently no known study that has focused on the effects of the different factors that influence the M&E of government interventions. The objective of this paper is to critically analyse the effects of different environmental factors on M&E of government interventions. This paper is an attempt to close the knowledge gap in the current literature. This research is qualitative and is based on a robust literature review of the existing literature on M&E and the theory of change, chaos and complexity. The research followed an interpretive, social constructivist paradigm which basically starts from an assumption that when M&E experts, scholars and practitioners construct meaning of their world, and in making sense of that world, they are influenced by their historical, economic, social and cultural backgrounds. This paradigm resonates well with the research's central objective of identifying, explaining and interpreting the environmental factors that influence M&E. The main finding in this paper is that there are many natural and intellectual (man-made) environmental factors that affect M&E. Change caused by these environmental factors is chaotic, complex and unpredictable. The effects of these environmental factors on the M&E of government interventions is inevitable because organisations are open systems. An M&E endeavour which ignores the effects of natural and intellectual (man-made) environmental factors on M&E cannot produce accurate information and valid recommendations. Therefore, M&E scholars, professionals and practitioners should take into account the environmental context in which M&E is done in order to produce more accurate M&E results and valid recommendations.*

**Key Words:** *Monitoring and evaluation, M&E, public policy, chaos and complexity, open systems, act of God, internal environment, external environment*

**JEL Classification: H83**

## **1. INTRODUCTION**

The objective of this paper is to evaluate the factors that influence M&E of government interventions in a chaotic and complex organisational environment. The paper starts with a conceptual analysis to explain M&E of government interventions and proceeds with a contextual analysis to discuss the causes of chaos and complexity in the M&E of government interventions and the environment and how such chaos and complexity within the organisational complicate/affect M&E. The paper concludes with a brief discussion of what can be done to evaluate government interventions in a complex and chaotic organisational environment and the recommendations for future research.

## **2. MONITORING AND EVALUATION (M&E): A CONCEPTUAL AND CONTEXTUAL ORIENTATION**

Monitoring is “a continuous function/process that uses systematic methods to collect data on specific performance indicators of government interventions in order to provide management and the main stakeholders with facts and evidence for failure or success of an ongoing development intervention in order to track the extent of progress towards the achievement of objectives and progress in the use of allocated funds” (Kusek and Rist, 2004:12). Monitoring requires an up-to-date documented plan of the intervention, showing clearly what government intervention is being implemented, when it must be implemented (start date, mid-term milestone dates, completion date), where exactly the intervention is supposed to be implemented, why it is implemented (the registered/recorded problem or problems that necessitated the intervention in question), who the beneficiaries and/or stakeholders are, who is responsible for what actions in the implementation process, how everything must proceed, etc. (Nalubega & Uwizeyimana, 2019:2). Monitors (or monitoring officers) must record the data (and information) about the status (progress) of the government intervention as they see it happening (but do not have to explain why) (Uwizeyimana, 2019).

A closer look at Bloom, Englehart, Furst, Hill, and Krathwohl’s (1956) Taxonomy in Figure 1 shows that monitors only need to see, observe, recognise, and recall the facts (i.e. to remember) and to (correctly) capture the observed facts in a record system (a database, datasheet, and/or an electronic device such as a computer). Monitoring must be conducted on regular basis (hourly, daily) in order

to avoid missing valuable data and information. This is why the concept of monitoring is also defined as the ability to systematically track progress made against the adopted plan on a regular basis and to ensure compliance with the aspects contained in the (implementation) plan (Ho, 2003:68-70). Monitoring progress in terms of “outputs” gathers data on service delivery and policy implementation, while monitoring progress in terms of “outcomes” gathers and presents data on the worth and value of the intervention itself (Ho, 2003:68-70). The function of monitors (or monitoring officers) is important because they help to capture (record and safely store) data and information that are used to conduct evaluations.

Evaluation uses and depends on the data and information collected through systematic monitoring of government interventions (Salandy, 2018). As such, monitoring is a prerequisite for evaluation because without it, it is almost impossible to objectively “determine the relevance and fulfilment of objectives, development efficiency, effectiveness, impact, and sustainability” of government interventions (Rabie and Goldman, 2014:4-6). One must therefore conduct systematic and objective monitoring of government interventions in order to evaluate their performance (Saunders, 2015:3).

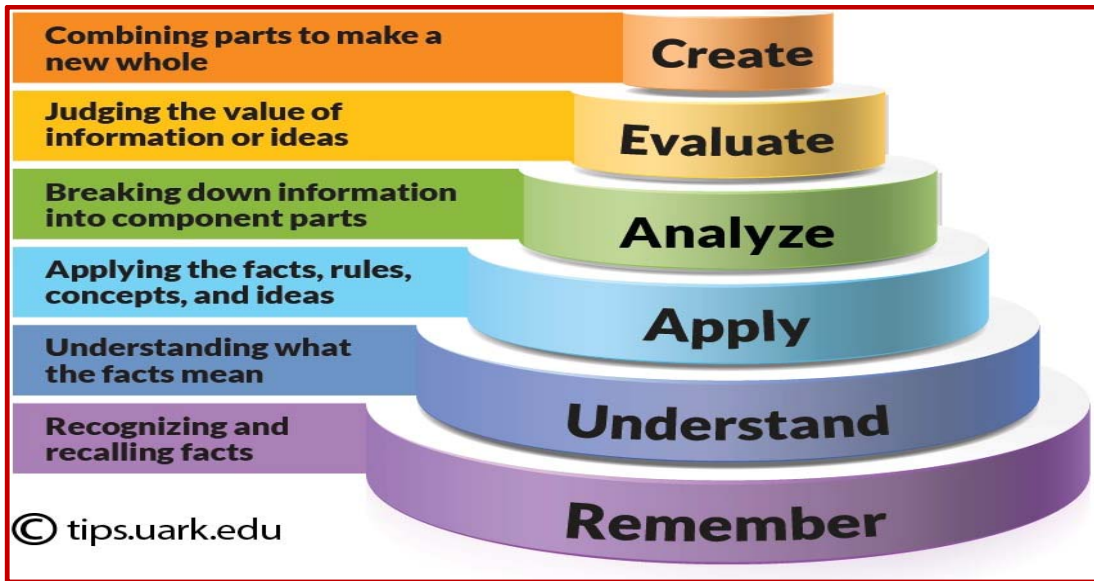
Rabie and Cloete (2009:2) distinguish between formal and informal evaluation. They argue that “informal evaluations inform daily decisions on how good or bad, desirable or undesirable something is” and that formal evaluations are “more systematic and rigorous ... with appropriate controls for the effects of extraneous environmental factors that could have an impact on the validity and reliability of the findings and conclusions” (Rabie and Cloete, 2009:2). Evaluation should take a systematic approach to evaluate every aspect of the different parts of the logframe from the quality and quantity of the input, the efficiency and economy in the acquisition, and the allocation (or use) of the input, the efficiency in the transformation of the input into output, the quality and quantity of output, the effectiveness and efficiency of the output, the effectiveness and efficiency in how the output achieved the outcomes, to the efficiency and effectiveness in the way the outcomes have achieved the impacts (Uwizeyimana 2019). This means that systematic evaluation should go beyond focusing on the “intended output, outcomes and impact” (what) to include and explain (why) the [what] that is observed happened that way (Uwizeyimana, 2019).

Huitt’s (2011) “*Bloom et al.’s Taxonomy of the Cognitive Domain*” shows that evaluation is more than just comparing status quo ante (so-called baseline data: before the policy project was initiated) and data at the cut-off point, which signals

the end of the evaluation period (so-called end or culmination data) (Cloete, 2017:17) and is more about having the ability to analyse. The person who carries the title of or who is called an evaluator should possess the capacity to analyse (and is therefore an analyst) because evaluation is about “judging the value of information and ideas” (Huitt, 2011:1).

However, there is no better way to explain the concept “evaluation” and what evaluators do (or are expected to be able to do and the requisite cognitive abilities) than examining what Bloom *et al.*'s (1956) *Taxonomy of Educational Objectives: The Classification of Educational Goals* says about “evaluation” as a cognitive skill. According to Bloom *et al.* (1956), an evaluator must possess the highest level of cognitive abilities. According to Bloom *et al.*'s (1956) classification of educational goals, before a person qualifies as an evaluator or acquires the status of “evaluation expert (or practitioner)”, he/she must first successfully complete the different stages of cognitive domains. Firstly, the evaluator must be trained “to recognise and recall facts” (**remember**) about the evaluand (the object and subject of evaluation). Secondly, he/she must be able to understand what the facts mean (**understand**). Thirdly, he/she must be able to apply the facts, rules, and ideas (**apply**). Fourthly, he/she must be able to break down the information into component parts (**analyse**). The fifth stage, which is more applicable to this research, is possessing the abilities to judge the value of information and ideas (**evaluate**), and the sixth and final highest stage is the ability to **create**, which is explained as the ability to use the information before him/her to make recommendations for improvement and make evidence-based decisions on the way forward (Bloom *et al.*, 1956; Huitt, 2011:1-2). Following is Bloom's Taxonomy created by the University of Kansas and published on UARK.EDU.

**Figure-1: Figure 1: Bloom’s Taxonomy in the form of a multi-tiered cake or “cake-style” hierarchy**



Source: (University of Kansas and UARK.EDU, n.d.:2).

To understand the true meaning and the importance of evaluation, one must consider the position of evaluation in Figure 1. To evaluate is to “choose, estimate, judge, defend, criticise, justify” (Bloom *et al.*, 1956; Huitt, 2011:1-2). In order to be able to “justify”, one must “present facts or evidence, defend one’s opinion by making judgements about information”, and finally defending “the validity of ideas or quality of work based on a set of criteria” (Huitt, 2011:1). The ability to know what happened does not make one an evaluator. It is the ability to explain the meaning of what happened to the management, the stakeholders, and the beneficiaries, etc. and then to explain “why” what happened, happened the way it did, and to make evidence-based conclusions and recommendations for future improvement of the evaluand that distinguishes competent evaluators from false or incompetent ones. This is what makes evaluation “a higher-order policy management function”, as noted by Cloete (2009:309). That is why evaluation is placed at number five (second highest) just under “create” as the sixth and highest cognitive skill on the six “cognitive domains” (Bloom *et al.*, 1956). The author’s firm view is that evaluators cannot provide a valid and convincing explanation about why things have happened the way they did without complete knowledge

and appraisal of the different environmental factors or factors that have affected government interventions.

The fact that evaluators must deeply think about all output, outcomes, and impact (both positive and negative, intended and unintended, direct and indirect) and then think about all possible factors that could have led to the observed success or failure of the government intervention in terms of what they had set out to achieve, and why unexpected results are occurring (Bhikhoo and Louw-Potgieter, 2014:152) has also been advocated by Kusek and Rist (2004:12), who define evaluation as the systematic, objective, and contextualised assessment of an ongoing or completed government intervention from the design to the implementation and results. This view has also been advocated by the Organisation for Economic Co-operation and Development (OECD, 2002:21), which defines evaluation as the ability to determine the relevance and fulfilment of objectives, development efficiency, effectiveness, impact, and the sustainability of the results.

The definitions provided by the OECD (2002:2), Kusek and Rist (2004:12), Rossi, Lipsey and Freeman (2004:58,427), and Owen (2006:255) suggest that evaluation goes beyond the verification of “compliance to aspects contained in the plan” as suggested by Ho (2003:68-70) and includes planned and unplanned, intended and unintended, positive and negative, direct and indirect output, outcomes, and impacts of the interventions and their sustainability. According to Rossi, Lipsey and Freeman (2004:16), evaluation uses “social research methods in order to systematically investigate the effectiveness of social intervention programmes in ways that are adapted to their political and organisational environments...” The fact that the “results” of government interventions must be “relevant” implies that they must be relevant in terms of addressing the socioeconomic issues that affect communities, which also emphasises the importance of context or environment.

Finally, the emphasis on context in evaluation is also highlighted by Scriven (2003:7), who argues that while “evaluators need a repertoire of empirical research skills, they also require additional evaluative skills that enable them to search for ‘side effects’ that may influence the evaluation conclusion, determine relevant technical, legal and scientific values and synthesis skills to integrate evaluative and factual information.” Scriven’s (2003:7) emphasis on the importance of “side effects” is further confirmation that the M&E of government interventions does not happen in a vacuum. Scriven’s (2003:7) argument is supported by Woodrow and Oatley (2013:4), who also argue that M&E is conducted within the context or environment in which government interventions

take place. Following are the main categories of environmental and contextual factors that influence government interventions.

### **3. NATURAL ENVIRONMENT (ACT OF GOD) VERSUS INTELLECTUAL (ACT OF MAN, MAN-MADE) ENVIRONMENTAL FACTORS**

The literature review shows that M&E takes place within two types of environments, namely the natural environment and the man-made environment. Natural environmental factors (also often called acts of God) include things that take place without human effort, desire, control, or intervention, such as earthquakes, climate change, draught, tsunamis, hurricanes, rain, sun, etc., but which have major impacts on human activities and human existence. For example, a government could decide to intervene in solving a housing problem in a particular community. While construction is underway, a hurricane (such as cyclone *Idai* which befell Mozambique, Malawi, and Zimbabwe in 2019) destroys villages, killing thousands of people, and destroying almost everything in its path, including government housing projects. A full explanation of their effects on the failure or success of these interventions must be emphasised in the evaluation report.

In addition, government interventions are also affected by anthropogenic (also called man-made or intellectual) factors. These are environmental factors that take place inside and outside the organisation as a result of human (physical and intellectual) action. For example, the success or failure of government interventions can be affected by political instability, prolonged labour union strikes, war, corruption, poor management or leadership, human laziness, or increased human productivity, which are all the result of human intellectual activities (behaviour, action, or inaction). Different types of man-made factors and their effects on government interventions are discussed in the following section.

#### **3.1 Internal versus external environment factors**

The **internal or micro environment** is generally within the parameters of the organisation and includes the “creation of the application of legislation, regulations, codes and rules, vision and mission, strategic objectives, management (role players), organisational arrangements and structures (infrastructure), policies and procedures, systems, [and] institutional resources (people, capital, skills)” (Uwizeyimana, 2018).

There are two main types of external factors. These include **external-meso** environmental factors, which occur outside the parameters of public institutions

but at national (domestic) level. Factors from outside the organisation at national level include people, systems, resources, equipment, machinery, changes in existing laws or the introduction of new ones, demographic changes, levels of crime in society, etc. They also include technological factors (e.g. methods, computers, equipment, techniques, etc.), economical (e.g. fiscal arrangements, taxes, grants, etc.), social (e.g. unemployment, crime, etc.), political (e.g. legislation, political parties, etc.), cultural (e.g. diversity, religion, etc.), legal (e.g. regulations, policies, implications, etc.), and cultural factors (e.g. diversity, religion, language, etc.).

Other external factors are those that take place in the **external** or **macro** environment outside the country in the global (international) environment. They include factors such as the effects of the economic crisis of 2008 on national economies and budgets, the effects of global warming and climate change on local people, the effects of the trade war between the United States of America's President Donald Trump and China, etc. on exports and national budgets, especially in developing countries. For example, many developing countries depend on aid to fund their budgets and on Western development agencies to provide basic services to their people. Economic problems in Western countries have dire and direct effects on people in aid-dependent countries such as in Africa because Western donors tend to cut foreign aid to poor countries when they are facing financial crises at home.

In summary, natural and man-made phenomena inside and outside organisations exert one or a combination of different effects individually and all of them together exert a combined effect on government interventions. Their individual and composite effects could be tangible or intangible, visible or invisible, formal or informal, direct or indirect. The multiple effects from the influence of phenomena and actors within and outside organisations create a complex and chaotic web of effects on organisations and on government interventions and the environment in which the M&E of government interventions is conducted. The nature and causes of the chaotic and complex environment in which government interventions are implemented and evaluated are discussed next.

#### **4. THEORETICAL ANALYSIS: THE THEORY OF CHAOS AND COMPLEXITY WITHIN THE M&E OF GOVERNMENT INTERVENTIONS ENVIRONMENT**

Cloete (2006:2) and Kayuni (2010:30) argue that attempts to interpret, analyse, assess, or expand on the relevance of chaos and complexity for different aspects of public management have largely been undertaken in the early 2000s. However,



there is no known study that has focused on the effects of chaos and complexity on the M&E of government interventions in the current literature. First of all, while there are common features between a complex and a chaotic environment, “the two concepts are different” (Rickles, Hawe and Shiell, 2007:933). A system becomes “*complex*” when it generates “rich, collective, dynamical behaviour from simple interactions between large numbers of its subunits” (Rickles, Hawe and Shiell, 2007:933).

Furthermore, interactions between and among sub-units within a complex system generate emergent properties in the unit system that cannot be reduced to the sub-units (Rickles, Hawe and Shiell, 2007:933; Morgan and McMahon, 2017:17). For example, it was argued above that multiple factors from the natural environment and intellectual (man-made) environment that exist within the internal and external environment of the organisation in which the M&E of government interventions takes place generate quite a large number of effects (political, economic, social, technological, legal, etc.). Each type of environment and each type of factor generated are sub-units of the organisational system. Organisations are faced with multiple factors from both within and outside their environments because they are open systems. Government institutions are open systems because they depend on the environment in which they operate; the environment is dependent on them and there is a specific interaction between the system and the environment. An open system requires “organisational inputs from the environment, organisational processing by the organisation, organisational output and feedback to the environment” (Bernhardt, 2018:47).

Cloete (2006:2) argues that chaos is not the same as complexity and a complex environment differs from a chaotic environment. As Cloete (2006:2) explains, even though complex systems carry a heightened level of complexity, they might be following webs of predictable patterns that can be identified and studied in a systematic manner, while chaotic environments are totally random and unpredictable. Cloete (2006:1) states, “Chaos is when everything seems to be on the verge of collapse in a particular moment (let’s say today), yet somehow and for some [unknown] reasons [the something] emerges at a later stage (tomorrow, next week, next month or some years later) – in a new form with new structures or relationship.” Therefore, the use of chaos theory in the evaluation of government interventions is also concerned with “non-linear systems – systems in which an external change at local (micro) levels and at international (macro) levels causes disproportionate effects”, which randomly create new forms, new structures, and new relationships between the different units and subunits of an organisation (Muthan, 2015:15-17), which is argued to be an open system. The synonyms of

the concept “random” are “chance, accidental, haphazard, arbitrary, casual, unsystematic, indiscriminate and unplanned” (Oxford English Dictionary, 2018).

According to Lomofsky (2016:9), what all this means is that change in the environment in which government interventions are implemented is chaotic simply because it is “beyond our control”, it is “dynamic and multidimensional”, it is “cumulative, with tipping points”, it is always “emergent and often unexpected”, it “involves people who behave in ways that we cannot predetermine and have agency (we cannot control what they do or how they think)”, and, finally, it “necessitates basing our programme design on evidence of what works; and does not take place in isolation and happens at different levels of the system” (Lomofsky, 2016:9).

The fact that an open system is affected by multiple factors from the internal and external environment (both natural and man-made) listed above in non-linear, unpredictable, and random ways that explain chaos in the organisation and its environments fits well with the phenomenon popularly known as the “butterfly effect” (Cronjé, 2014:21). The butterfly effect refers to “the phenomenon whereby a minute localized change in a complex system can have large effects elsewhere” (Basu, 2017:1). Schneider and Somers (2006:351) argue that Edward Lorenz “first encountered the butterfly effect while studying weather patterns, pointing to the inherent nonlinearity of such systems due to the high degree of inter-relatedness between its parts.” If one considers the butterfly effect, it can be argued that each part of the organisational environment affects the others in unpredictable ways and while the effect of one unit on the others in a complex system can be identified and isolated using systematic methods (e.g. the effects of a budget cut as a result of the economic downturn on the organisation’s ability to complete projects – meeting the specified timeline, quality and quantity), the effects of one unit on the others in a chaotic situation are difficult to isolate simply because such interactions are random and highly unpredictable (Muthan, 2015:15-16).

The butterfly effect is a feature of M&E because of the multiple levels and multiple sources of the different factors inside and outside organisations and the fact that organisations are open systems that cannot stop their influence on the external environment and cannot escape from being influenced by factors from within and from outside their boundaries. For example, an economic downturn in South Africa, which is caused by the falling demand for South African commodities by China, the United States of America, or the United Kingdom (to name but a few), will most likely affect the South African government’s ability to fund its national, provincial, and local governments and state-owned entities such

as Eskom, the South African Broadcasting Corporation (SABC), and South African Airways (SAA), among others. Each one of these organisations' ability to obtain the necessary funding will affect their ability to buy inputs (pay staff/people, material, etc.). Lower salaries might be paid, and staff retrenchment might follow, which could lead to strikes and destruction of property by striking workers. In other cases, lack of or low budget can lead to cutting corners by using poor-quality material and as a result producing poor-quality output, poor outcomes, and negative impacts for the South African people. Clearly, the cause of all this is something that takes place outside the African continent and over which even the South African government has no control. Yet the South African government, the different government institutions, and each person living in South Africa cannot escape the effects because of the globalised open market system in which countries operate. This single factor can have what Schneider and Somers (2006:351) call "the butterfly effect" on the whole South African government system.

A close analysis of Cloete's (2006) argument seems to suggest the existence of two different types of chaos in the environment. There seem to be types of chaos that Cloete (2006:1) calls "deterministic chaos" and "quantum chaotic" or "random chaotic." While "both so-called chaos (deterministic chaos) and quantum (randomly chaotic) are regarded as examples of the functioning of open systems", the two types of chaos differ (Cloete, 2006:1). According to Cloete (2006:2), "quantum chaos" is "un-deterministic" and therefore more difficult to predict than deterministic chaos. For example, as Cloete (2006:2) puts it, a deterministic chaotic situation or phenomenon is less complex and has more order and predictability than a "quantum chaotic situation or phenomena", "which are truly randomly chaotic and are replete with puzzling paradoxes and contra-intuitive characteristics" (Cloete, 2006:2). While Thornhill (2016:47) agrees with Cloete's (2006) argument that quantum chaos is randomly chaotic, he emphasises that quantum chaos only takes place at the quantum or molecular level of the system. Thornhill's (2016:47) location of the quantum chaos at the sub-atomic level contradicts Cloete's (2006) suggestion that quantum (randomly chaotic) is regarded as an example of the functioning of open systems. Thornhill (2016:48) explains that "the size of an atom as a constituent of a molecule is estimated as one ten millions of a millimetre ( $1/10^{-6}$ )" and he argues that at quantum level, "the study would involve the anomalous behaviour of particles within an atom" (Thornhill, 2016:48).

The fact that neither Cloete (2006:2) nor Thornhill (2016:47) indicates what constitutes the quantum level of a public or private organisation or whether M&E

at the quantum level would produce meaningful and useful results for evaluators suggests that the M&E of government interventions at the quantum level of an organisation might be difficult and might not even be useful for the purpose of this study. However, this in no way suggests that chaos at the quantum level does not impact the whole system and other systems far away, if one considers the butterfly effect discussed above. It is simply agreeing with Auriacombe and Ackron's (2015:15) argument that an attempt to evaluate tiny particles of a bigger and complex (open) system is a futile exercise and will not be able to fulfil the objectives of an evaluation because the evaluation of the whole system (considering the effects of all its components) is not the same or equal to the sum of the multiple micro-level evaluations of the same system.

Hence the evaluation of the whole system is far greater than the sum of the evaluations of its constituent components (Bergoing, Loayza and Piguillem, 2015:268), because organisations are open systems (Evan, 1993:5) and the interactions among their different parts and the effects on the whole system happen in a chaotic and complex way (Oehmen, Thuesen, Ruiz and Geraldi, 2015:6); the only meaningful and useful M&E of government interventions would pay serious attention to the effects of the different environmental factors within and outside these organisations.

Finally, based on the findings in this paper, the first thing M&E experts and scholars must do in order to conduct valid evaluations of government interventions in a complex and chaotic organisational environment is to accept the fact that change is chaotic and complex and is a permanent part of our lives (Baggio & Sainaghi, 2011:2). According to Cloete (2006:45), if evaluators accept that organisations are complex, dynamic, self-organising systems and are able to view M&E as a social science phenomenon to which chaos and complexity theories apply, then they will be able to improve their abilities to manage and evaluate "change in times of ... chaos and transitions to new orders of being." Evaluators need to change their mindset and methods of evaluation in order to match the current reality.

## **5. CONCLUSION**

The purpose of this paper was to analyse the factors that influence Monitoring and Evaluation (M&E) of government interventions in a chaotic and complex organisational environment. Its main argument was that the M&E of government

interventions takes place within an ever-changing, complex, and often chaotic environment because organisations are open systems. The factors that influence the M&E of government interventions within a chaotic and complex organisational environment presented in this paper are many. Among the many environmental factors that M&E scholars and experts must identify and whose effects they must consider when conducting M&E of government interventions are the direct and indirect effects of the natural environment and man-made (intellectual) environment. These two types of environments exist and operate inside and outside organisations at the same time, and they constantly affect each other and are constantly affected by multiple factors related to local/national and global events (i.e. phenomena) such as social, political, technological, cultural, and legal factors. It has been argued that a complex system contains a large number of autonomous parts, and that these parts are connected to each other and interact with each other in visible and invisible ways. Because of the complex and unpredictable interactions among the different parts of the system, an evaluation of the different parts of a complex system cannot be the same or equal to the evaluation of the whole system.

The combined effects of these multiple environmental factors create a complex and chaotic environment for government interventions, which requires evaluators to possess appropriate evaluation competencies. Because evaluation is a higher-order management function, it is highly ranked on Bloom *et al.*'s (1956) taxonomy which was discussed in this paper.

The chaos and complex environment in which government interventions are evaluated present a golden opportunity for professors and M&E experts at the institutions of higher learning such as universities to urgently start the process of coding M&E professional standards, skills, knowledge, attitudes and cognitive abilities in order to design appropriate M&E training programmes. It also requires people who want a career in M&E to gain appropriate M&E skills and qualifications that correspond with the cognitive levels highlighted in the Bloom's Taxonomy of the Cognitive Domain. Doing so will empower them to deal with the compounded effects of multiple factors that create the chaotic and complex environment and influence the M&E of government interventions.

Based on the above conclusion, the following need to be explored further:

- The quality and level of M&E training programmes that are currently provided at institutions of higher learning.
- The quality and level of qualifications and cognitive skills of current M&E practitioners.

## REFERENCES

- Auriacombe, C.J. and Ackron, J. (2015). PLG 3A Section A: Semester 1 Integrated Development Planning and LED Internal Handbook. Johannesburg: University of Johannesburg.
- Baggio, R. & Sainaghi, R. (2011). Complex and chaotic tourism systems: towards a quantitative approach. *International Journal of Contemporary Hospitality Management*, 1(1), 1-19.
- Basu, A. (2017). What is the Real Meaning of “Butterfly Effect” in 13 Reasons Why? <https://www.quora.com/What-is-the-real-meaning-of-butterfly-effect-in-13-reasons-why>.
- Bergoing, R., Loayza, N. and Piguillem, F. (2015). The whole is greater than the sum of its parts: Complementary reforms to address microeconomic distortions. *The World Bank Economic Review*, 30(2), 268-305.
- Bernhardt, Y. (2018). UJ Internal Handbook (APK & Sow) PMG3A1, PMG3AA3 & PGM3A11: Programme: Public Management and Governance (Third Year). Johannesburg: University of Johannesburg.
- Bhikhoo, A. and Louw-Potgieter, J. (2014). Case: Do managers use evaluation reports? A case study of a process evaluation for a grant-making organisation. In Cloete, F., Rabie, B. and De Coning, C. (Eds.). 2014. *Evaluation Management in South Africa and Africa*. Stellenbosch: Sun Press Imprint.
- Bloom, B., Englehart, M., Furst, E., Hill, W. and Krathwohl, D. (1956). *Taxonomy of Educational Objectives: The Classification of Educational Goals. Handbook I: Cognitive Domain*. New York and Toronto: Longmans Green.
- Cloete, F. (2006). Chaos and quantum complexity approaches to public management: Insights from the new sciences. *Administratio Publica*, 14(1), 45-83.
- Cloete, F. (2017). Module 2 (HEQF level 9): Policy evaluation theories, models, systems and processes, University of Johannesburg, Johannesburg.
- Cronjé, F. (2014). *A Time Traveller’s Guide: Our Next Ten Years*. Cape Town: Tafelberg.
- Evan, W.E. (1993). *Organization Theory: Research and Design*. New York: Macmillan.

- Ho, S.Y. (2003). *Evaluating Urban Policy, Ideology, Conflict and Compromise*. Surrey: Ashgate.
- Huitt, W. (2011). Bloom et al.'s Taxonomy of the Cognitive Domain. <http://www.edpsycinteractive.org/topics/cogsys/bloom.html>.
- Kayuni, H. (2010). Chaos-complexity theory and education policy: Lessons from Malawi's community day secondary schools. *Bulgarian Journal of Science and Education Policy (BJSEP)*, 4(1), 1-31.
- Kusek, J. and Rist, R. (2004). *Ten Steps to a Results-Based Monitoring and Evaluation System*. Washington, D.C.: The World Bank.
- Lomofsky, D. (2016). *Theory of Change: A Way of Thinking, a Way of Doing and a Way of Learning*. <http://www.samea.org.za/index.php?module=Pagesetter&type=file&func=get&tid=17&fid=file1&pid=37>.
- Morgan, T. and McMahon, C. (2017). *Constructivism and Complexity: A Philosophical Basis for Experiential Learning Models in Engineering Design Education?* [https://www.itas.kit.edu/downloads/veranstaltung\\_2017\\_philosophy\\_of\\_models\\_morgan.pdf](https://www.itas.kit.edu/downloads/veranstaltung_2017_philosophy_of_models_morgan.pdf).
- Muthan, V. public service comM. (2015). *Using Chaos and Complexity Theory to Design Robust Leadership Architecture for South African Technology Businesses*. Master's Thesis. University of the Witwatersrand, Johannesburg.
- Nalubega, T. & Uwizeyimana, D.E.(2019). Public sector monitoring and evaluation in the Fourth Industrial Revolution: Implications for Africa, *Africa's Public Service Delivery and Performance Review* 7(1):1-12, a318. <https://doi.org/10.4102/apsdpr.v7i1.318>.
- Oehmen, J., Thuesen, C., Ruiz, P. and Geraldi, J. (2015). *Complexity Management for Projects, Programmes, and Portfolios: An Engineering Systems Perspective*. [http://orbit.dtu.dk/files/108586258/Complexity\\_Management.pdf](http://orbit.dtu.dk/files/108586258/Complexity_Management.pdf).
- Organisation for Economic Co-operation and Development (OECD). (2002). *Evaluation and Aid Effectiveness: Glossary of Key Terms in Evaluation and Results-Based Management*. Paris: OECD.
- Owen, J.M. (2006). *Program Evaluation: Forms and Approaches*. (3<sup>rd</sup> ed.). New York: The Guilford Press.

- Oxford English Dictionary*. (2018). Definition of 'Normal' in English. <https://en.oxforddictionaries.com/definition/normal>.
- Public Service Commission. (2008). Basic Concepts in Monitoring and Evaluation. <http://www.psc.gov.za/documents/docs/guidelines/PSC%206%20in%20one.pdf>.
- Rabie, B. & Cloete, F. (2009). A new typology of monitoring and evaluation approaches. *Administratio Publica*, 17(3), 76-97.
- Rabie, B. and Goldman, I. (2014). The context of evaluation management. In Cloete, F., Rabie, B. and De Coning, C (Eds.). *Evaluation Management in South Africa and Africa*. Stellenbosch: Sun Press.
- Rickles, D., Hawe, P. and Shiell, A. (2007). A simple guide to chaos and complexity. *Journal of Epidemiology and Community Health*, 61(11), 933-937.
- Rossi, P.H., Lipsey, M.W. and Freeman, H.E. (2004). *Evaluation: A Systematic Approach*. (7<sup>th</sup> ed.). London: Sage Publications.
- Salandy, A. (2018). Building Blocks for a Useful Programme Monitoring and Evaluation System. <https://www.uniteforsight.org/conference/ppt-2018/Anthony%20Salandy.pdf>.
- Saunders, R. (2015). *Implementation Monitoring and Process Evaluation*. Singapore: Sage Publications.
- Schneider, M. and Somers, M. (2006). Organizations as complex adaptive systems: Implications of complexity theory for leadership research. *The Leadership Quarterly*, 17(1), 351-365.
- Scriven, M. (2003). Michael Scriven on the Difference Between Evaluation and Social Science Research. <https://sparkaction.org/content/michael-scriven-differences-between-evaluation-and-social-science-research>.
- Thornhill, C. (2016). Quantum physics, cosmology and public administration: Compatibility in theory construction? *Administratio Publica*, 24(1), 45-58.
- University of Kansas and UARK.EDU. (n.d.). Using Bloom's Taxonomy to Write Effective Learning Objectives. <https://tips.uark.edu/using-blooms-taxonomy/>.
- Uwizeyimana, D.E. (2018). Progress made towards achieving Rwanda's Vision 2020: Key indicators' targets. *International Journal of Management Practice*, 12(1), 4-46.



Uwizeyimana, DE. (2019). The logframe as a monitoring and evaluation tool for government interventions in a chaotic and complex government interventions' environment. *Africa's Public Service Delivery and Performance Review* (forthcoming issue).

Woodrow, P. and Oatley, N. (2013). Change in Conflict, Security & Justice Programmes: Part I: What They Are, Different Types, How to Develop and Use Them. London: Department of International Development, UK Aid from the British People.