Towards a typology of models in Public Administration and Management as field of scientific inquiry

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ABSTRACT

Models are often the envisioned outcome of research endeavours in Public Administration and Management (PAM). Especially post-graduate studies intend to construct models as ideal type interventions to improve policy, structures, systems, functions and behaviour in government settings. The scientific underpinnings associated with model construction and the nature of the type of models that are available are, however, often not understood clearly.

The purpose of this article is firstly, to gain conceptual clarification about the concept model and secondly, to contribute towards constructing a typology of models in PAM as a discipline. Typologies fulfil a classification function. Therefore it is proposed that a typology of models in PAM could aid in an appropriate design of research endeavours to achieve the desired end result and make meaningful contributions to the field of PAM research in general.

INTRODUCTION

Construction of models is a popular output intended by research in Public Administration and Management (PAM). A search on the National Research Foundation's (NRF) Nexus database system (March 2013) revealed that twenty one masters' and doctoral titles in PAM during the period 2000–2012 contain the concept *model*, whilst a significant 1 248 titles in social sciences and humanities within the same period include the concept *model* as well. Often masters' and doctoral candidates develop a model to serve as a *solution* to a research problem which they have identified. *Integrated* or *comprehensive* models are regularly proposed as ideal-type models for the improvement of a policy, system, process or behaviour within the context of the public sector.

It may seem that the construction of models is prevalent in PAM research endeavours. However, text books on the methodology of research (South African editions) that are commonly prescribed, recommended and cited for purposes of research proposal writing and empirical research, shows a different scenario. Examples of such publications are Huysamen (1993), Welman, Kruger and Mitchell (2005), De Vos, Strydom, Fouché, and Delport (2005), as well as Babbie and Mouton (2011). These sources either do not refer to models at all, or in the case of De Vos *et al.* (2005), they provide a definition for a particular type of model, but do not explain the scientific processes associated with constructing such a model. As a result, certain questions remain:

- What constitutes a model?
- Which different categories of models are described in literature for applied research endeavours within the social sciences?
- What should be considered when developing a typology of models for a scientific inquiry in the study field of PAM?

In operationalising these questions, the purpose of this article is twofold: *firstly* to gain conceptual clarification of the concept *model* in social sciences in general, and in PAM in particular; and *secondly,* to provide suggestions on constructing a typology of models in PAM as a discipline. Typologies fulfil a classification function, and as such this article proposes that a typology of models in PAM could help to design appropriate research processes, in order to achieve the desired end result and contribute meaningfully to the rigor, depth and relevance of PAM research. Thus, it is argued that researchers in PAM should have a clear understanding of the type, as well as the purpose of the model they intend to construct. This will enable such researchers to design their research (i.e. hypothesis, data collection.) in such a way as to provide the intended end product (model) as intervention for a research problem which they have identified.

NATURE OF KNOWLEDGE PRODUCTION AND KNOWLEDGE UTILISATION IN APPLIED SOCIAL SCIENCES

The way knowledge is constructed in the epistemology of social sciences has been a continually contested field (Bruno 1989; Hyland and Bondi 2006). Guba (1990:18) explains that three questions are at stake in the production of knowledge:

- The *ontological* question: what is the nature of the *knowable*? or, what is the nature of *reality*?
- The *epistemological* question: what is the nature of the relationship between the *knower* (the inquirer) and the *known* entity (or knowable)?
- The *methodological* question: how should the inquirer go about to acquire knowledge on this entity?

Answers to these three fundamental questions define the system or paradigm (Kuhn 1970) that the inquirer might adopt in such a research. Guba (1990:19) and Hollis (2004:67) continue to explain that all belief systems or paradigms are human constructions, and hence subject to the plethora of errors and foibles that inevitably accompany human endeavours. In

the case of the social sciences it is generally expected that scientific research will present a model of rationality and reasoning to clarify and classify social phenomena. Models derived from such a scientific endeavour are then subjected to testing through the screening of empirical evidence (in a positivist paradigm) by logical and objective argumentation and explanations. The reality, however, is that theories and models in the social sciences cannot always be tested with absolute certainty – hence the debate continues on facts versus values in contemporary scientific discourse (*c.f.* Fischer 1983:6).

Within the branch of applied sciences, disciplines focus strongly on the application of knowledge; thus, it is concerned with the *usefulness* or *relevance* of knowledge that is generated by certain research endeavours (Keen 1980; Denning 1989). It is argued that a value-chain should exist between knowledge production (KP) and knowledge utilisation (KU) (Sarantakos 1993:17). Denzin and Lincoln (1985:57) in this regard refer to the *transferability* of knowledge to ensure the applicability and relevance of a research process. De Vos *et al.* (2005:109) explain as well that in the genre of applied research, the field of *interventional* research has a specific mission to provide possible solutions to practical problems. They define interventional research as research aimed at addressing the application of research in practice. Interventional research's objectives are generally exploratory, descriptive and explanatory (De Vos *et al.* 2005:392).

It could be argued that models provide an ideal means to convey the way in which practice (i.e. the public sector) should conduct itself when addressing societal and governance problems. Models could thus enable the researcher to complete the value-chain by linking KP to KU in the sense that models could help to apply knowledge in practice.

NATURE OF SCIENTIFIC INQUIRY IN PUBLIC ADMINISTRATION AND MANAGEMENT

The diverse nature of scientific inquiry in PAM is a subject of a dynamic discourse conducted around the globe – a discourse that Greenwood and Eggins (1995) refer to as *shifting sands* and Kettl (2000) as a *revolution*. These *shifting sands* and *revolutions* are characterised by, for example, the following dynamics and contributions: Gulick and Urwick (1937) considered the *science* of PAM; Caiden (1971) and Henry (1975) made significant contributions to the paradigmatic debate in this discipline; Frederickson (1997, 2005) searched for the *spirit* of public administration; Borins (1994), Hughes (2003), McLaughlin, Osborne and Ferlie (2002), as well as Kooiman (2006), focused on the emergence of a governance focus; Daneke (1990) and Lynn (1996) posed the question whether the discipline is an art, science or profession; Miller and Dunn (2006) proposed a *critical theory* for the field; Shafritz and Hyde (2007), as well as Dwivedi and Williams (2011), undertook a *historical odyssey* to explore the state of the discipline, and Pollitt (1993) indicated how *managerialism* influences scientific inquiry.

In the case of South Africa, Cloete (2008:19–38) reflected on the paradigmatic shifts that Public Administration research underwent during the period 1990 – 2007, and states that value, institutional, and behavioural changes have influenced the nature of research in the discipline significantly.

According to Nesbit, Moulton, Robinson, Smith, DeHart-Davis, Feeney, Gazley and Hou (2011), PAM is a field that is characterised by a wide diversity in theoretical approaches,

scope, as well as in methodological tactics. This wide scope lends itself to potential epistemological and methodological fragmentation, which may prevent scholars from appreciating each other's work adequately and building on this work. This argument is supported by Perry and Kraemer (1986), as well as Raadschelders (1999), who postulates that given its diverse background, it is not surprising that no *mega-theory* of PAM exists.

There seems to be consensus among scholars that PAM can be regarded as an applied field of scientific inquiry within the social branch of science (*see* Rabin, Hildreth and Miller 1989; Denhardt and Denhardt 2009; Kettl and Fessler 2009). The aim of PAM research could be described broadly as: the study of branches of government in pursuit of the common good by enhancing civil society and contributing to social justice. Thus this science is primarily dedicated to the betterment of humanity's condition (Schneider and Ingram 1997). As an applied science, it is expected that knowledge utilisation (KU), intervention and practical relevance should characterise research output. Ensuring relevance to practitioners while maintaining scientific rigor, does however, hold significant challenges in the discipline.

PAM's wide scope of inquiry lends itself to potential epistemological and methodological fragmentation, which may hinder progress in this field (Berlin and Solow 2009:175). In pursuit of rigor, some scholars may follow quantitative approaches and ignore qualitative approaches (Brower, Abolafia and Carr 2000). In this regard Auriacombe and Mouton (2007:442) argue that due to the nature of PAM research, qualitative research methods are better suited to help understand people's perceptions and opinions, as well as the dynamics of social phenomena. They add that a wide variety of research methods are available to PAM researchers in their quest to make sense of government functions, activities, and also their attempts to evaluate public policy and programmes. To this position Cloete (2006:682) adds that evaluation research should become more prominent in Public Administration research, to determine whether a social intervention, policy, or programme has produced the intended result in practice. The fact remains, however, that a lack of scientific rigor may compromise the applicability of research results to address real government problems.

The idea of relevance in PAM is generally connected to a sense that academics should be producing knowledge, which will guide practitioners in public administration. Such a focus on practice is often viewed as a core trade-off to research that builds theory and/or over-emphasises the methodology. The problem is: to be accessible, research viewed as relevant may be grounded in *best practices*, rather than academic theories or technically fine-tuned methodology (Bozeman 1993; Lynn, Heinrich and Hill 2001).

As stated earlier, the NRF Nexus database reflects the relative popularity of model-building within PAM research. Reasons why model-building is prevalent may be pointed out in the applied nature of PAM research. Due to its applied, interventionist nature, knowledge utilisation (KU) should be presented ideally in a *workable*, relevant format for practitioners. The scientific feature of a model provides the means to this end. In the next section, models and model-building are expounded briefly.

CONCEPTUALISING MODELS AND MODEL-BUILDING

The word, *model*, turns up frequently in scientific inquiry. Definitions of this concept are largely dependent on the particular notions that the user ascribes to it. This is confirmed by

Mouton and Marais (1988:139) who define a model in terms of a heuristic function. Botha (1993:237) explains that the etymological roots of the concept *model* can be found in the Latin word *modulus,* which means *small scale*.

Shoemaker, Tankard and Lasorsa (2004) explain that scientists' knowledge and understanding of the world is often represented by means of scientific models. The scientific method concerned is basically one of creating, verifying, and modifying models of the world, or of *reality*. The scientist in the applied sciences then uses these models to make specific predictions regarding phenomena. According to Little (2012) models are thus central to scientific thinking and essential to many kinds of practical problem-solving.

Davies and Lewis (1971:29) argue that as soon as scientists enquire about the reasons why a phenomenon behaves in a particular way, enquiry enters the domain of theory. According to them the purpose of theory building, and the construction of models, is to assist in the explanation or solution of particular problems; also to help perceive the connection between the phenomena and the behaviour which they exhibit. Lave and March (1993:vii) support this view and state that a central feature of modern thinking in the social and behavioural sciences is the use of formal models that are useful to help predict, understand, influence and appreciate human life. According to Lave and March (1993:6) the social sciences include ideas about transition (changes in social patterns), about demographics (features of a population, migration), as well as ideas about structure (the way in which society is organised).

Imbued with different meanings in different contexts, the concept *model* implies structure and relationships among variables, but simultaneously conveys tentativeness and incompleteness (Ashby and Stogdill 1970; Lui 2012:4). To this insight Abdulghafar (2011:108) adds that models assume the existence of structure and relationships among variables. Bailey (1978:435) defines a model as a "presentation of a system that differs from the actual system in some way, but is accurate enough to provide information on the system". He continues to add the notions of *copy*, *replica* and *analogy* to his definition of models. Quade (1989:143) defines a model as "… a substitute for reality … a representation of reality". This definition is supported by Thompson and Strickland (1995:875) who argue that a model may be regarded as the depicted simplification of a more complex phenomenon. De Vos *et al.* (2005:36) and Abdulghafar (2011:111) confirm that social science models do not include all the features of the system that are modelled, but only those necessary for research purposes.

Lave and March (1993:19) suggest that a model is required of the model-building process as such. A common challenge in model-building is that some dimensions or elements of a phenomenon can be over-emphasised, leaving the impression that it is more important/significant than other elements or dimensions. It thus shifts the attention away from potentially more significant variables that may impact on the issue under investigation.

Figure 1 Characteristics of models: a synopsis

• Implies structure • Indicates relationships among variables • Has a heuristic function • Imperfect, incomplete and tentative • Simplification of complex explanation	• Fit the task • Used to construct theory • Simplifies the presentation of a system • A substitute for reality • Directs inquiry

This concludes a brief overview of the nature in which knowledge is produced and utilised, the nature of research in PAM, as well as the characteristics of models. With this orientation in mind, as well as the operationalisation of this article's purpose, the next section will attempt to develop a typology of models to be utilised in the study field of PAM.

TOWARDS A TYPOLOGY OF MODELS IN PUBLIC ADMINISTRATION AND MANAGEMENT

As alluded to earlier, a literature review reveals that a wide variety of conceptions and meanings are ascribed to the concept of *model*. It is the intension of this article to contribute towards the construction of a typology of models as applied in PAM. Mouton and Marais (1988:137) define a typology as a conceptual framework that fulfils a classification or categorising function. A typology provides a reference framework for analysis. De Vos *et al.* (2005:35) define a typology as a conceptual framework in which phenomena are classified in terms of characteristics which they have in common with other phenomena. According to König (2003:449) classification into types is a widely used scientific method. Basically, the intention is to arrange concrete forms into conceptual categories. Below is an attempt to categorise the different meanings attached to models and linked to the contexts in which they are used. The various types of models below are not presented in a particular order or sequence.

Models as theory-building instruments

Lin (1976:42) states that the utilisation of models constitutes an effective way to construct and evaluate potential theories. In this regard, a model can be defined as a representation of some aspect of a theory. Philosophers of science tend to view a model as an analogy to a theory or *yet-to-be-validated* theory (Lin 1976:42). Williams (2003:45) describes a theoretical model as a translation mechanism moving from the abstract to the concrete. Also Kerlinger (in De Vos *et al.* 2005:39) hints that a model "springs from a theory". De Vos *et al.* (2005:39) indicate, however, that in the models used in social sciences are often constructed first and only then does a theory gradually emerge from the construct.

Mouton and Marais (1988:139) confirm that in the social sciences the semantic borders between theory and model are often very fluid. As a result these concepts can be employed as synonyms. Mouton and Marais (1988:139) further explain that theories and models are often differentiated based on differences of degree: models with a heuristic function, and theories having an explanatory function. Mouton (2011:176) seems to use *theory-building* and *model-building* as alternating terms. He describes a model as a conceptual framework particularly used in a grounded theory approach. In light of this he highlights the fact the typical applications of models in conceptual studies are aimed at developing new models and theories or refining existing ones. Also the philosopher of science, Karl Popper (in Snyman 1993:37), employs models to give logical and rational reconstructions of social phenomena.

Lin (1976:43–51) argues that models facilitate a researcher's progress from the fundamental elements of a theory toward a realised one. For this purpose various levels of models are utilised:

- *Classification models*: specify the values, categories, or classes of a concept. This may be constructed either from conceptualisation, or from empirical observations.
- *Typological models*: specify the cross-distribution of two or more concepts. The basic requirement is that a dimensional model must be constructed for each concept concerned. These two or more concepts are then cross-classified according to the dimensions each shows. The benefit of a typological model is that it is a convenient way to describe a function of two or more variables in such a way that interaction effects can be stated simply.
- *Contingency models*: specify the likelihood that one category of one concept may occur, given the occurrence of the other category of a corresponding concept.
- *Associative models*: specify the linear tendency of relationship among the categories of two or more concepts. This indicates the likelihood of observing each category of a concept under each possible condition which the categories of another concept may hold. As such, it specifies a co-variational relation between concepts.
- *Functional models*: specify a one-on-one relationship between the categories of two or more concepts. This allows the researcher to predict, for each value of the independent variable, one corresponding value of the dependent variable. A functional model should also fulfil all the requirements of the preceding models mentioned.

Lin (1976:52) presents these five models linearly as steps or levels towards theory construction. According to Guba (1990:35) and Sarantakos (1993:9) such an elaborate theoretical structure represents the ultimate application in the use of models in theory construction.

According to Tarabanis, Peristeras and Fragidis (2001:987) models in contemporary Public Administration were first introduced by Herbert A. Simon in his work *Administrative Behavior* (1976). Simon made important contributions to model-building through his Behavioral Model of Rational Choice, which explains a rational way for arriving at a particular decision.

Models as metaphors or analogies

Bless, Higson-Smith and Kagee (2007:14) describe an analogy in science as the correspondence between a phenomenon or event that has been studied previously and another phenomenon or event that resembles the first, but has not yet been studied. An analogy allows the scientist to draw conclusions based on the similarities between objects based on some of their properties. Comparing these objects or facts that have been identified as analogues allows one to infer some properties of the less well-known objects (Guba 1990:97). Analogy in model-building is used when a well-known object or phenomenon serves as a model for another object or phenomenon, which is the subject of scientific enquiry. In building a model of the object or phenomenon certain properties thereof are singled out for purposes of investigation (Bless, Higson-Smith and Kagee 2007:16).

Botha (1993:40) postulates that analogue models are often utilised in the social sciences. Probably the most well-known example of models as analogues is provided by Giere (1979:79) who explained that models in science can be described in general terms as follows: "There is a type of system, such as atoms, about which not much is known. However, there are other systems, such as solar systems, about which a lot is known. Someone then suggests

that maybe the unknown type of system is like the known one in certain important respects. This in turn suggests questions that one should ask about the unknown system." In this context a model suggests ways of answering fundamental questions and lead to the construction of new theories. In this respect, models could be regarded as scientific metaphors. Mouton and Marais (1988:140) refer to this tendency as the "as if" character of models.

Stout (2009:289) proposes that the metaphor of tradition can foster specific attitudes towards the public service in students who are enrolled in public administration, while simultaneously helping students to make sense of the diverse ideations presented in the theories of this field. This is of particular value because public administration is experiencing an *identity crisis* related to competing interpretations of legitimacy and associated role conceptualisations. In light of this, Stout suggests that the metaphor of *tradition* enables students to organise competing ideas, in order to make more conscious choices among themselves, instead of presenting public administration as a *mixed bag* of inner philosophical tensions and fragmentation that each practitioner must sort out on his or her own. The organising themes that are applied are commonly historical in nature, referring to Orthodox public administration, New Public Administration, New Public Management, New Public Service, and the like.

Models as ideal-type

Taagepera (2008) argues that society needs more from social sciences than the latter have delivered thus far. According to him science is not only concerned about the empirical *What is* question, but also very much about the conceptual *How should it be* question. In this regard, De Vaus (1994:9) refers to ideal-type models as a description of the *perfect* or *best* way to postulate an outcome or achieve a practice. In social sciences this could include behavioural and normative/ethical dimensions, such as a model for good governance (e.g. based on international best practice and normative guidelines).

In administrative science, Max Weber's ideal-type model for bureaucracies exerts an important influence (*cf.* König 2003:449). To some the ideal-type is an empirical term, to others, a category of objective correctness. König (2003:449) argues that in public administration teaching, Weber's bureaucracy concept has been understood as a *prescriptive* and *rational* model.

In an interventionist, qualitative research design the construction of an ideal-type model holds a distinct advantage. There are various examples of such ideal-type models in PAM. Stout (2009:293) proposes, for example, the need for an ideal-type model to educate public employees in their various roles. This implies reflecting on their conceptualisations of the public service, their level of social concern, their commitment, and their orientation toward technical and democratic issues, as well as their interaction with politicians. Stout continues to suggest that a trichotomous model should be designed to serve as an ideal-type model for PA education. Arellano-Gault and del Castillo-Vega (2004:519) further developed an ideal-type model for public administration, which is based on a comparative analysis of Anglo-Saxon, Latin, and Scandinavian political traditions. Hernes (2005:5–17) also developed ideal-type organisational response models for New Public Management reforms. Furthermore, Maphunye (2009) searches for an ideal-type public administration within a democratic, developmental state context. Emery and Wyser (2005) of the European Group

of Public Administration (EGPA) investigate ideal-type models according to which the public sector in Europe could be reformed.

Models as an approach

An approach is often (incorrectly) also referred to as a model. Within a policy-making context, for example, Dye (1995:17) defines a model as a particular approach to the study of policy dynamics. Dye (1995:17) continues to explain that models simplify and clarify thought processes, it directs inquiry, and suggests explanations for a particular policy-related phenomenon.

An approach, in its etymological sense, however, is general in nature and is based primarily on a single, central concept. Models can be considered as a refined and more specific version of approaches. Thus several models can be constructed within a single approach. In PAM, approaches (also referred to as *schools*, see Fox, Schwella and Wissink 1991:9) assist as models in the study of administration, management and organisational dynamics. Typical approaches include the classical, behavioural, open system, and contingency approaches to direct inquiry.

According to Cloete and Wissink (2000:31–49) in public policy analysis, models are divided into two broad categories:

- models appropriate for analysing the content, results, impacts and likely consequences of policy, and
- models appropriate for analysing the process of policy-making, such as who is involved, why and how.

It could be argued that these categories can also be applied to other typical functional areas in PAM, such as organisational theory, human resource management, financial management, and project management.

Models as cases or scenarios

According to De Vos *et al.* (2005:428) it makes sense to commence a scientific inquiry with a model case or model scenario. This implies a situation, person, action or event to which the concept applies that is to be analysed. A model case is thus an imaginary or hypothetical situation to which the concept applies (Yin 2004). Once a model scenario or case has been created, then detailed analyses could follow. De Vos *et al.* (2005:429) propose that this analysis should consider those elements of the scenario which are essential to the phenomenon under investigation.

It should be noted that the word *scenario* in this case is not used in its (strategic) managerial meaning, referring to assumptions and mental models ensuring success in the future, but rather refers to a present *situation* or *case*.

Tellis (1997) states that a case study provides an *ideal methodology* when a holistic, in-depth investigation is needed. Case studies have been used in varied investigations, particularly in sociological studies, but increasingly in instruction. In the case of PAM, the use of case studies is well documented and are often utilised in the teaching of this study field. Andrews (1953:215) and Graham (2011) for example, state that PAM case studies are ideal

to tell a story (about the public sector). Such studies mirror real life, but can also describe actual experiences. Cases furthermore add elements of problem-solving, and complexity to thinking about the challenging world of public administration. Case studies let practitioners share knowledge, insight, and cautionary tales from their own experience. They can help in avoiding the re-invention of the wheel, which often happens across governments. In this respect Barzelay (1993:306) refers to PAM case studies as "intellectually ambitious inquiry" within public sector research. Zainal (2007) confirms this view and states that although case study methods remain a controversial approach to collect data, such methods are widely recognised in many social science studies, especially when in-depth explanations of social phenomena are sought.

Models as simulations

Models as simulations refer to mathematical, statistical, and computer-aided presentations. Gilbert and Troitzsch (2005:1) explain that computer simulation in the social sciences is a relative new idea and are only being utilised widely since the 1990s. They argue that simulations hold significant potential because it is an excellent way of modelling and understanding social phenomena. Gilbert and Troitzsch (2005:2) define a simulation as a particular type of modelling. Especially relevant to social science, according to Norlén (1976:172), are statistical models which are applied to predict the values of dependent variables. Simulations by means of computer programmes can be used as a method to construct certain theories. Once the theory is formalised into a programme, then behaviour of the simulation can be observed. Gilbert and Troitzsch (2005:4) further highlight the benefits of models as simulations as it facilitates understanding and prediction (i.e. in the case of demographical models).

Typical simulation models in the social sciences, according to Gilbert and Troitzsch (2005) include:

- world models;
- micro-analytical simulation models;
- queuing models;
- multilevel simulation models;
- multi-agent models; and
- learning and evolutionary models.

Advances in computer technology have allowed for the development of statistical techniques, which can be used to construct and test complex models, which represent social and behavioural processes. These techniques provide social scientists with methodological tools to bridge the gap between theory and research in practice. If the model entails a mathematical equation, it may be possible to infer its behaviour by a process of mathematical reasoning. If the model entails a statistical equation, a statistical analysis can be conducted through programmes such as Statistical Package for the Social Sciences (SPSS).

Computer simulation is set to become an important new method of building and evaluating theories in the social sciences. A rapidly emerging specialised field in this regard is known as Spatial Social Science, which recognises the key role that spatial concepts, such as distance, location, proximity, neighbourhood, and region play in governmental

spatial planning (O'Sullivan and Unwin 2002). Clarke (2001) explains that Geographical Information Systems (GIS), cartographic visualisation, pattern recognition, spatially sensitive statistical analysis, and place-based search methods are the tools that spatial social science apply to integrate knowledge across disciplines and paradigms. From research design to the interpretation of research findings, spatial thinking and the use of spatial methods may significantly aid PAM research in general.

Models as conceptual frameworks

Literature studies reveal two types of conceptual frameworks. *Firstly*, on a more abstract level, Mouton and Marais (1988:137) refer to a conceptual framework as an attempt to give structure to theory and models. They identify three types of conceptual frameworks, namely typologies, models and theories. In this sense a conceptual framework can be regarded as a broad system according to which theories and models are structured in scientific inquiry.

Secondly, on a more practical level, a conceptual framework simply refers to the framework according to which studies in the particular field will be structured. In this regard Smit (1985:9) refers to the importance of a model as a *work scheme* in the design of research, as well as to provide a framework for data collection. Maree (2012:42) agrees with this assertion and regards a model as synonymous with a conceptual framework. A conceptual framework or map, according to Maree (2012:42) is the researcher's "map of the territory being investigated; a think tool".

It seems that conceptual models in PAM research are currently aimed at utilising such frameworks as tools to frame research and that the abstract use thereof is extremely limited (i.e. when it comes to structuring new theory and models).

Models as graphical presentations and visual aids

In its most elementary form a model may refer to a graphical presentation of a process, function or system. This may take the form of diagrams, figures, tables, charts or schemes. From this vantage point a model simply enables the reader to visually register and comprehend all the variables and relationships among them that the researcher considers as part of the research. Botha (1993:237) confirms that models could be simple diagrams that illustrate a "web of relationships between constructs".

Models as physical presentations are frequently utilised to aid scientific inquiry or to serve as a means to synthesise research findings and recommendations. In this sense it can follow the format of structural models, sequence or process models, or of content models. Such models can also be presented to illustrate the macro- (i.e. environmental), meso- (i.e. processes and systems) and micro- (i.e. functional content) dimensions to delayer complex phenomena. Models as graphical presentations can also represent the content of a process and the interrelatedness of variables included in a (conceptual) model, often referred to as *inner working* models.

De Vos *et al.* (2005:353) identify models to help organise a qualitative report, such as chronology, themes, composite and portraits. Gilbert and Terna (2000:58), as well as Fan *et al.* (2012:784), propose that in the design of models as graphical presentations, the following aspects should be considered:

- structure or layout of the model (e.g. visually clear; convey meaning);
- means to illustrate the (inter-) relationship between variables;
- objective of the model (i.e. to illustrate or describe);
- level of detail; and
- parameters and scope of the model.

Williams (2003:204) adds that models could be utilised to convey research results. In the case of PAM, such models are often referred to as *comprehensive* or *integrated*. In this sense such models act as a graphical description of the proposed way public institutions should conduct itself in improving systems, structures, functions, processes, methods and behaviour.

Figure 2 Synopsis – A typology of models in PAM research

• models as theory-building instruments • models as metaphors or analogues • models as ideal-types • models as approaches	• models as cases or scenarios • models as simulations • models as conceptual frameworks • models as graphical presentations and visual aids

Based on the identified typology of models and the nature of research in PAM explained above, the following table suggests some applications of the typology of models in PAM as field of scientific inquiry.

Table 1 Towards a typology of models in PAM research

Type of model	Application in PAM research
As theory-building instruments	Meta-theoretical, paradigmatic, theoretical and conceptual model-building endeavours to construct knowledge in the following areas: • culture (e.g. public service ethos and values, vision) • environment (e.g. context, government, the political system, needs of society, technology) • resource utilisation (e.g. financial, human, technological) • organisation and structures and • function (e.g. processes, activities, procedures, tools, techniques, tasks, management functions and applications)

As metaphors or analogues	• Attempts to appreciate the roles and influences of:
	  ◦ structure, organisations, leadership, human
	  ◦ nature, values and bounded rationality
	• This could also include the application of theories from a range of reference or adjacent disciplines to real-life governance problems

As ideal-types	This could include: • normative, ethical and behavioural models to shape the professionalisation of the public service • budget-maximising models • bureau-shaping models • comparative Public Administration models • good governance models

Type of model	Application in PAM research
As approaches	This could include: • Models such as the classical, behaviour, open systems and contingency schools • Models to study specific applications (i.e. functional areas or domains of specialisation) within PAM, such as organisational analysis, leadership, financial management, policy-making, etc. Popular models in policy, for example: ◦ mass/elite model ◦ group model ◦ institutional model ◦ policy process models ◦ social interaction model ◦ policy network and communities models ◦ functional phases models ◦ generic process model of policy development (*see* De Coning and Cloete 2000:29–40; Roux *et al.* 2002:88)
As cases or scenarios	This could include case studies from: • civil organisation • public institutions in all spheres of government • non-governmental organisations (NGOs) • community-based organisations (CBOs) • regional organisations • international and transnational organisations
As simulations	This could include: • computer-aided modelling • GIS-enabled application models • demographical studies • statistical modelling based on statistics obtained from e.g. StatsSA for government planning
As conceptual frameworks	• On an abstract level, this could include theoretical frameworks for research design; and on a lower, practical level, this could include the structure of PAM research for the inclusion of certain dimensions and constructs • This could also be utilised for knowledge production and construction in inter-, multi- , and trans-disciplinary research
As graphical presentations and visual aid	This could include: • Visual presentations of research findings as structural, process or content models for application in public sector settings • Research report writing (i.e. Master's and doctoral dissertations and theses, policy reports, contract research reports, etc.)

CONCLUSION

This article aimed to help clarify models and to facilitate the development of a typology of models in PAM knowledge production. It was argued that a typology of models in PAM could aid in designing research in such a way as to achieve the desired end-result (model) and that models could contribute meaningfully to enhancing PAM research as a whole.

The building or construction of models as output of research endeavours in PAM research will probably remain popular as a means to facilitate knowledge utilisation in this field of study. Academics, supervisors and promoters should familiarise themselves with the scientific

underpinnings associated with model-building to ensure that knowledge production can be transferred into knowledge utilisation.

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