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# A Health Care Management Control Model for Effective Performance of the South African Public Health Care System

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**Abstract**
This paper evaluates processes and mechanisms for monitoring and evaluating activities in the South African Public Health Care System. The overriding motive of the study is to postulate a comprehensive public healthcare management control model for measuring and improving the performance of the South African public health care system. The study is hinged on the underpinning assumption that the application of a comprehensive public healthcare management control model would significantly result into improving monitoring and evaluation of processes and methods for implementing public healthcare plans and strategies in the South African public healthcare system. Confirmatory factor analysis was used to determine whether the priori public healthcare management theory reproduces the observed sample data. The fitness of the model was assessed using the values of the Chi-Square analysis, the standardized regression weights (factor loadings), and Squared Multiple Correlation Coefficient ($R^2$). The alternative fit indices which were used included; the incremental fit indices, absolute fit indices, and parsimony adjusted measures. The chi-square and alternative modification indices indicated that the hypothesized public healthcare management control theory perfectly fits the observed sample data.
**Keywords:** Management Control Model; Performance and Public Health Care System, Fitness, Modification Fit Indices

## 1. INTRODUCTION

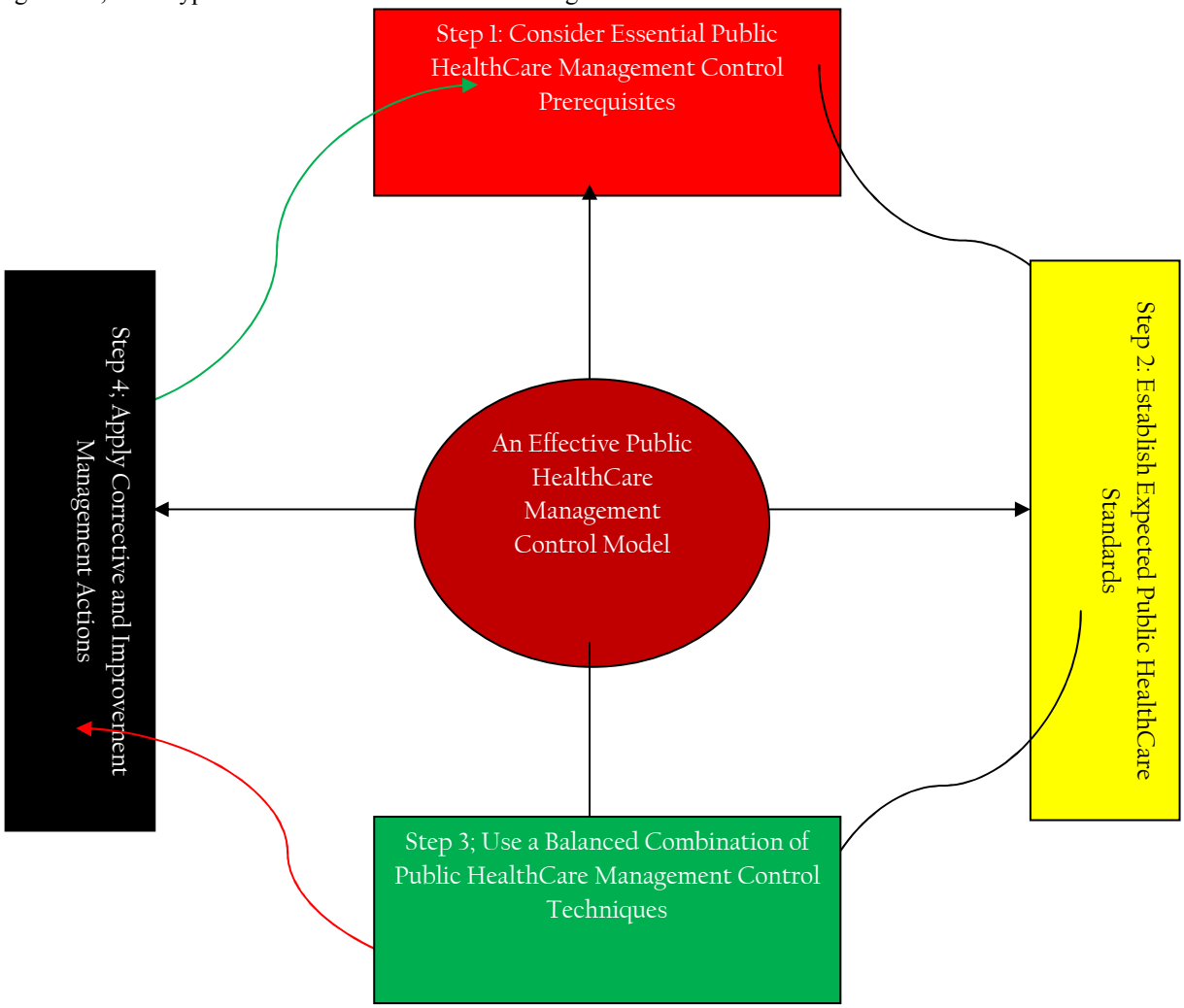
The study is motivated by the fact that studies conducted by authors such as the Health System Trust (2009:1), Pillay (2008:10) and Chetty (2008:2) attribute the causes of increasing failures in the South African public healthcare system to factors other than lack of application of accompanying management control model during and after implementation of public healthcare plans and strategies. The Health System Trust (2009:1) links failures in the South African public healthcare system to lack of application of appropriate implementation strategies. The Health System Trust (2009:1) noted that lack of skills, poor implementation, and constant governmental and political unwillingness limit the application of appropriate strategies for successful implementation of public healthcare plans. It pointed out that unsuccessful implementation of public healthcare plans has been at the forefront of the factors rendering it difficult for the South African public healthcare system to achieve public health care objectives and goals which are outlined in the Alma-Ata Declaration (1978), Millennium Development Goals (1990-2015) and National Health Plan, 1994. The Health System Trust's (2009:1) views are echoed in the contents of the National Development Plan Document (2011:301) which reveal that despite several public healthcare plans and programmes which have been implemented since 1994, the South African public healthcare system is still characterized with failures across a number of programmes, among which are; maternal and child health, HIV/AIDS, and Tuberculosis. The National Health Report (2010) also noted that limited health infrastructure, shortage of medications and medical equipments, poor health services' delivery processes and limited medical personnel are the other challenges characterizing the South African public healthcare system.

In other words, the Health System Trust (2009:1) concurs with Pillay (2008:10) and Chetty (2008:2) who attributed the causes of the South African health department's inability to achieve strategic national health objectives and goals to inadequate skilful human resources, poor planning, shortage of finance, poor implementation of health plans and strategies, government reluctance, and corruption. Despite the fact that one would certainly agree with the Health System Trust (2009:1), Pillay (2008:10) and Chetty (2008:2), none of them, however, questioned how the application of an accompanying comprehensive public healthcare management control model could result into significant improving implementation of public healthcare plans and programmes, and subsequently the performance of the South African Public Health Care System. It is at that angle that this study differs from studies conducted by the Health System Trust (2009:1), Pillay (2008:10) and Chetty (2008:2), and any other author that tows their lines of thought. Contrary to the Health System Trust's (2009:1), Pillay's (2008:10) and Chetty's (2008:2) theories, Aurora and Kale (2007:204) Griffin (2004:249), and Rao and Narayana (2007:66) share similar views that modern organizational practices reveal that there is a significant direct positive relationship between the application of accompanying monitoring and evaluation

mechanisms and successful implementation of the organization's plans and strategies. Aurora and Kale (2007:204) and authors such Griffin (2004:249), and Rao and Narayana (2007:66) based their arguments on the fact that the application of accompanying monitoring and evaluation mechanisms enables deviations to be identified and corrected as plans and strategies are implemented. They pointed out that early identifications and correction of deviations saves organizations from failing to achieve the desired strategic goals and objectives, and incurring costs which are associated with late identifications and correction of deviations.

Basing on Aurora and Kale's (2007:204) school of thought and any other author who shares a similar line of argument, this author, points out that this study is premised on the overriding assumption that the application of accompanying public healthcare management control model would significantly result into the successful implementations of public healthcare plans and programmes. It is also hypothesized that the control model's resulting effect on successful implementations of public healthcare plans and programmes would also positively impact on improving general performance of the South African Public Health System. As indicated in Figure 1.1, this study conceptualizes that a comprehensive public healthcare management control system refers to a control model involving the application of four main constructs; identifying key public healthcare management control pre-requisites, setting appropriate public healthcare standards, appying a balanced combination of public healthcare management control techniques, and continuously applying improvement actions.

Figure 1.1; The Hypothesized Public HealthCare Management Control Model




However, organizational practices in the South African public healthcare system indicate that evaluation, monitoring and controlling of activities of the implemented public healthcare plans and programmes fall short of the four constructs. It is on that basis that this study links the failures of the implemented public healthcare programmes to lack of use of appropriate accompanying public healthcare management control model during and after implementation of public healthcare programmes in the South African public healthcare system.

Despite towing Aurora and Kale's (2007:204) line of argument, the author of this document shares the same view with Engelbrecht and Crisp (2010:1), de Jager, du Plooy and Ayadi (2009), Ogembo-Kachieng and Ogara (2004:23), Mallapaty (1999:2), and Kollberg (2007), who postulated that constant evaluation and monitoring of health activities, can significantly result into improve implementation of public healthcare programmes and

performance of a public health care system. But still, the author of this document disagrees that a single monitoring technique can lead to improved performance, since neither Engelbrecht and Crisp (2010:1), de Jager et al. (2009), Ogembo-Kachieng and Ogara (2004:23), Mallapaty (1999:2), nor Kollberg (2007), examined the impact of a comprehensive management control model on provision of public health care services. This study differs on the basis that authors such as Mallapaty (1999:2) limited his study to investigating the application of the concept of Total Quality Management (TQM) in the public health system. The evaluation of health services quality is important for control and continuous improvement, however without an integrated and comprehensive approach, the success in one department can be easily outplayed by failures in another (Robbins, Odendaal, & Roodt, 2003:129). The establishment of a comprehensive management information system is one of the key factors for establishing a successful management control system (Ogembo-Kachieng & Ogara, 2004:23). Nonetheless, limiting the study to the importance of an health information system, without providing how the generated realtime information can be used to enhance monitoring and evaluation of activities contributes little to the existing wealth of knowledge on how control of public health care services can be improved.

In South Africa, de Jager et al. (2009) applied Parasuraman (1988)'s SERVQUAL Framework in measuring in and out patient's satisfactions with public health care services, and in Australia, Firth, Frances and Mellor (2004) questioned how the E- Commerce concept can be adopted to improve public health care services. Delcarme (2010:6) and Engelbrecht and Crisp (2010:1) stressed the importance of performance management as the means of improving performance in the South African Public Health Care System. In spite of the fact that all these investigated areas deal with how management controls can be used to improve successful implementation of healthcare programmes in a public health care system, none of them provided a comprehensive management control framework which outlines processes, critical areas, and techniques for evaluating activities in a typical public health care setting. In other words each of the studies focused on individual and discrete areas or techniques of a management control system. This study differs and hypothesises a priori health care management control model which highlights that a comprehensive health care management control system can lead to improving performance of a public health care system, if it considers systematic, chronological, logical and cyclical processes encompassing; identifying key public healthcare management control pre-requisites, setting appropriate expected public healthcare standards, appying a balanced combination of public healthcare management control techniques, and continuously applying corrective and improvementmanagement actions. Basing on the four constructs in Figure 1.1, the next section provides an overview of the management control literature and the theoretical grounding of the study.

## 2. THE LITERATURE ON STRATEGIC MANAGEMENT CONTROL SYSTEMS

Aurora and Kale (2007:204) stated that a management control system refers to a set of techniques and processes for monitoring, evaluating and controlling the organisation's activities, in order to ensure that activities are not only being accomplished according to the prescribed plans and standards, but also that the activities will lead to the achievement of the desired organizational strategic objectives and goals. In order to effectively evaluate and control organizational activities, Aurora and Kale (2007:204) pointed out that the traditional management control model prescribes that there are three main constructs which must be observed. They stated that these constructs encompass; setting standards, measuring and comparing actual with expected performance, and undertaking corrective management actions. However, deriving from the conceptualization in Figure 1.1, this researcher disagrees and hypotheses that the effectiveness of a management control model is determined by four constructs; considering management control pre-requisites, setting expected performance standards, applying management control techniques, and undertaking corrective and improvement management actions. Contrary to the articulations in the traditional three-tier management control model, the evaluations and discussions of relevant theories and literatures in this section are in effect guided by the same four hypothesized constructs, in order to demonstrate how the four constructs determine the successful implementation of a management control model.

### 2.1 The Pre-Requisites of a Management Control System

Despite the existence of an effective strategic plan, Wren Bedeian and Breeze, (2002:11) stated that the creation of appropriate structures enhances the control and management of the organization's activities. Wren et al. (2002:11) based their arguments on the fact that structuring organizations according different functional departments or division or units improves monitoring and evaluating of activities. They argued that it is because the created units render it easier to monitor and control smaller units of divided activities as compared to the activities in larger undivided organizations. However, Hill and Jones (2007:106) argued that the relevance of organizational structuring as a predictor for a successful management control system may be limited, unless if organizations take careful approach to develop structures which are appropriate and less complex. In other words, he emphasized that the selected structure must not stifle the interaction between top management, employees and other stakeholders. He added that there is a tendency for most modern organizations to prefer flat structures, because it facilitates constant supervision, real-time monitoring and information gathering for further improvements possible. Meanwhile, Stephen and Hartman (2009:4) pointed out that an overly emphasized bureaucratic structure leads to the creation of central tenets which causes an unrelenting need to develop more

lines of authority, and subsequently causes the organization to be unresponsive and ineffective to changes in the external business environment. They added that impersonality arising from a highly bureaucratic structure can easily turn to be the source of employee frustration due to the increasing red tape which hinders the implementation of the agreed plans and strategies.

On the other hand, Dessler (2002:116) stated that the existence of appropriate supporting rules, regulations and procedures may also determine the successful monitoring and evaluating of organizational activities. However, Moorhead and Griffin (2000:588) pointed out that **a**s much as regulations and procedures are essential for the creation of an effective management control system, the overemphasis or the existence of more rigid regulations and procedures may be the source of employees' de-motivations and dissatisfactions. They added that organizations rely on their employees to evaluate and control a number of activities, and therefore the effectiveness of monitoring and evaluating activities is most likely to be significantly affected if employees are dissatisfied and de-motivated. Since 100% of the organisation's activities are accomplished by its employees, McCraken and Wallace (2000:467) posited that the achievement of the desired strategic goals and objectives are unlikely to be possible, unless if the organization continuously ensures that it is being led by capable individuals.

In other words, McCraken and Wallace (2000:467) assertions signify that the existence of effective leadership is fundamental for the successful implementation of the organisational management control system. McCraken and Wallace's (2000:467) views rhymes with Robbins and Coulter's (2003:498) perceptions that leading refers to the process of providing appropriate guidance, influence and motivation in order to ensure that the organizational activities are effectively executed. McCraken and Wallace's (2000:467) seem to imply that there are positive correlations between between leading and planning and strategy implementation, as well as the extent of effective coordination of activities between the created divisions or units within the organizational structure. Nevertheless, Vogt and Murrel (1990:8) pointed out that a thorough evaluation of modern public sector activities would indicate that employee empowerment is one of the key predictors for the successful monitoring and evaluating of public sector activities. According to Vogt and Murrel (1990:8) the use of employee empowerment enables employees to be self-monitoring and evaluating. However, Bowen and Lawler (1995:32) stated that sharing power and decision making authorities with employees is important, but insufficient for the organizational to effectively realize the value of empowerment. They suggested that empowerment must not only be about sharing power, but also about sharing four important organizational ingredients with frontline employees. These four ingredients are; information about the organizational performance, rewards based on the organizational performance, knowledge that enables employees to understand and contribute to organizational performance and power to make decisions that influence organizational direction and performance (Bowen & Lawler, 1995:32).

Nonetheless, Blakley (2011:1) stated that not only does employee empowerment determine the successful implementations of management control system, but the establishment of an effective information system is one of the other modern management control pre-requisites as well. According to Blakley (2001:1), trends reveal that modern organizations are increasingly relying on computers and their information systems to perform a number of evaluation, monitoring and control activities. However, Laudon and Laudon (2006: 53) pointed out that the realization of such positive relationship is predicted by the extent to which the organization incorporates all the three core elements of an effective information system into its information systems. Laudon and Laudon (2007: 53) stated that there are three types of MIS; Decision Support System (DSS), Information Reporting (IR) and Executive Information Systems (EIS). Stoops, Williamson and Heywood (2000) postulates a contrary view that the existence of the three core parts of information systems does not necessarily indicate that the organisation's information's systems will enhance the evaluation, monitoring and control of the organisation's activities. Citing Kirkpatrick (1996), Stoops et al. (2001) stated that the effectiveness of the organisation's information system as a basis for the existence of an effective management control mechanism can be measured at three different sequential levels. Level 1 deals with data collection, capturing, validation and reporting. Level 2 examines data interpretation and presentation to managers. Level 3 assesses how the information is used for decision-making. He argued that it is important to satisfy the Kirkpatrick's (1996) three levels for effective information systems, because invalid data or poor reporting may either lead to the devising of solutions for problems which are non-existent or if there is late reporting it can lead to late management reactions against the spotted deviations. It is thus hypothesized that;

- $\mathbf{H_0}$: Considering certain essential pre-requisites would result into successful implementing of a public healthcare management control system in the South African Public Health Care System.
- $\mathbf{H_1}$: There is no link between considering certain essential pre-requisites and resulting successful implementing of a public healthcare management control system in the South African Public Health Care System.

Besides considering the essential pre-requisites, this study also hypothesizes that a comprehensive management control model must have well set organizational expected performance standards.

**2.2 Setting Expected Organizational Performance Standards**

Stoner, Freeman and Gilbert (2008:480) posited that standards are guidelines which prescribe how activities in

certain identified critical points must be accomplished, in order to render the achieving of the organisation's outlined strategic objectives and goals possible. In other words, Stoner et al. (2008:480) construed that the set organizational standards are the measuring rods which are used in determining not only how organizational activities must be accomplished, but also whether the ongoing accomplishment of activities are in accordance with prescribed criteria or guidelines. Stoner et al.'s (2008:480) conceptualization of the meaning of organizational standards is resonated in Hill and Jones' (2007:188) argument. Hill and Jones (2007:188) noted that standards are the criteria for judging performance, goals or targets which managers can use to evaluate the performance of a division, a department, individual or the entire organization. Subsequently, Stoner et al. (2008:480) hinted that it is against such prescribed guidelines that expected standards are compared with actual performance in order to determine whether the prescribed standards have been met, and the process accomplished so far will aid in achieving the outlined objectives and goals.

According to Koontz and Weihrich (2010:382), the critical areas for standards' setting may encompass: physical standards, cost standards, capital standards, revenue standards, program standards, intangible standards and strategic plans as points for strategic controls. However, Koontz and Weihrich (2010:382) pointed out that intangible standards are not only usually more difficult to set, but cannot also easily be expressed in either physical or monetary measurements. They noted that it can be difficult to determine the standard against which the competence of staff can be assessed. Courty, Pascal, Heinrich and Marschke (2006:321) agreed with Koontz and Weihrich (2010:382) and noted that such difficulties also apply to determining standards on whether or not advertising programmes meet short term and long term objectives or whether the public relations programmes are effective? Courty et al (2006:321) further noted that it may also be difficult to set standards for assessing the supervisor's loyalty to the company objectives. Hoffman and Bateson (2004:324) however differed and stated that although standards for intangibles cannot be quantifiable, it can be measured on some other terms, and precisely using Parasuraman, Zeithmal and Bitner's (1985) SERVQUAL. Hoffman and Bateson (2004:324) further noted that in a service setting, the standard for service quality can be determined by the speed, fastness, empathy, responsiveness, warmness, and employees' attitudes. Hoffman and Bateson (2004:324) agreed with Arnauld, Price and Zinkhan (2002:327), and Jain and Saakshi (2006:149) and confirmed that these elements set the standards against which service quality is measured after the customer has undergone the consumption process of a service or a product traded. Besides setting appropriate standards, Hobb and Sheafer (2003:17) revealed that the monitoring and evaluation of the organisation's activities are unlikely to be successful, unless if a combination of feed forward, concurrent and feedback management control techniques are used. On this basis, it is thus hypothesized that;

- $\mathbf{H_0}$: Setting appropriate expected performance standards would determine the successful implementing of a public healthcare management control system in the South African Public Health Care System.
- $\mathbf{H_1}$: There is no link between setting appropriate expected performance standards and the successful implementing of a public healthcare management control system in the South African Public Health Care System.

**2.3 The Use of a Balanced Combination of Management Control Technique**

Hobb and Sheafer (2003:17) stated that feed forward management control techniques, are mechanisms which help organisations detect future changes in the organisation's business environment, so that appropriate remedies can be devised. In order to achieve these objectives, Hobb and Sheafer (2003:17) emphasised that the organisation's feedback management control system must apply Network Analysis and Critical Path Method (CPM), Programme Evaluation and Review Technique (PERT), SWOT Analysis and forecasting. Although Gido and Clements (2003:14) agreed that the application of a combination of these feed forward management control techniques may enable the organisation to identify and prevent future detractions, Lamers (2002:325) advised that their applications do not necessarily imply that any deviations arising from future events can be prevented. This is because, as Lamers (2002:325) stated organisations exist in an unstable business environment, and whereas some future changes can easily be predicted, it may not be the cases for some uncertain and sudden future events. On the other hand, Korman (2004:30) stated that concurrent management controls refer to the techniques which enable the organisation to evaluate, monitor and measure the effectiveness of the activities as they are executed. In other words, they stated that it enables organisations to detect deviations and undertake corrective management actions before the damage and the associated costs become significant.

Weihrich and Koontz (2005:102) noted on the other hand that performance management is one of the concurrent control techniques. Despite the fact that there is no general consensus on the definition of performance management, Weihrich and Koontz (2005:102) argued that performance management is an assessment system which considers personal factors, leadership factors, team factors, systems factors, and contextual or situational variables when managing, measuring, modifying and rewarding performance. Nel, Gerber, Van Dyk, Haasbroek, Schultz, Sono, and Werner (2004:475) stated that the ABC Model of Behaviour Change is one of the techniques which are applied in performance measurement.They added that the model comprises of three elements; Antecedents, Behaviour and Consequences—ABC. Nel et al (2004:475) further noted that despite the fact that the application of ABC Model of Behaviour Change can lead to effective undertaking of performance

measurement, its effectiveness has sometimes been limited by the organisation's conflicts and politics. Eckerson (2006:10) however noted that the application of performance management must be accompanied with other control techniques such as Management By Objectives (MBO). He argued that MBO refers to the process where employees are entrusted with the process of managing and controlling the organisation's activities, with the consequence that managers can only be notified to intervene where the deviations are quite grave. In effect, Eckerson (2006:10) revealed that MBO is not affected by the negative impacts arising from conflicts between managers and employees.

Eckerson (2006:10) stated that MBO deploys techniques encompassing; Dashboards, Traffic Lighting, and Balanced Scorecards. These techniques, as Dahbhilakar, Mandar and Bengtsson (2002:181) noted use computer devices and are therefore not affected by any biasness within the organisation. However, Dahbhilakar et al. (2002:181) noted that their effective applications imply that organisations must invest sufficient funds in their information systems and employees must be trained on how to effectively use the installed devices. Chenhall and Chapman (2006:35) stated that other concurrent management control techniques are; benchmarking, and performance appraisal. Palmer (2005:75) added that the conceptual frameworks for analyzing service encounter and Gronroos model on perceived service quality management are the other commonly used concurrent management control techniques which are used in modern organizations. Marchesan and Formoso (2009:5) stated that what can be noted is that the applications of all these concurrent management control techniques enable the disadvantages of one technique to be outplayed by the advantages of the other.

Marchesan and Formoso (2009:5) concurred with Ballard (2000:137) that feedback control mechanism contains the third set of management control techniques which organisations use to evaluate the successes and failures of activities. Tripathi and Reddy (2006:325) argued that feedback control mechanisms, unlike feed forward and concurrent management control techniques, evaluate activities only after its performance is completed. They further noted that the common forms of feed back management control techniques are; budgets, financial statements and ratio analysis, Return on Investment (ROI), Residual Income (RI), Economic Value Added (EVA), Break- even Analysis, Internal and External Audit. Tripathi and Reddy (2006:269) stated that the feedback management control mechanisms provide comprehensive and detailed reports which are important for deciding the next course of actions. Through this, they indicated that feedback control mechanisms enable organisations to efficiently plan and use the available limited resources more efficiently and effectively. However, Ajibolade, Arowomola and Ojikutu (2009:1) argued that feedback management control mechanisms do not provide real time information to render the undertaking of appropriate corrective management actions possible. Because of this, they say, feedback management control mechanisms do not enable organisations to immediately reverse deviating trends which may nevertheless turn to be damaging and more costly. Hence it is hypothesized that;

- **$H_0$:** Using a combination of feed forward, concurrent and feedback management control techniques would result into significant improving monitoring and evaluating of activities in the South African public healthcare system.
- **$H_1$**: There is no link between using a combination of feed forward, concurrent and feedback management control techniques and resulting significant improving monitoring and evaluating of activities in the South African public healthcare system.

**2.4 Undertaking Corrective and Improvement Management Actions**

As a result of the application of a balanced combination of management control techniques, Gupta and Sharma (2003:11) revealed that organisations may undertake certain appropriate corrective actions in cases of deviations. But still they stated that improvement actions must not only be reserved for situations where there are deviations, since organisations need to undertake constant improvement measures even if positive feedbacks are obtained. Despite the fact Brigham and Houston (2004:66) revealed that organisations have usually resorted to only the revision of plans, strategies, goals and objectives, Sharma (2006:1) stated that certain improvement actions may involve undertaking; Six-Sigma application, Total Quality Management (TQM), Business Process Re-engineering (BPR), and change management and transformation strategies.

Although the applications of certain strategies like business process re-engineering and TQM may require tremendous transformations in the ways the organisational activities are executed, Mourier and Smith (2000:32) stated that in a number of instances such transformations are not accompanied with appropriate change management strategies. The end result, they noted have usually been reflected in the inability of the wanted changes to improve the implementation of a particular improvement measure and subsequently the effectiveness of the management control system as a whole. In whole, the above presented management control literatures demonstrate that some authors consider that the consideration of certain essential pre-requisites determine the extent to which a management control model is successfully implemented. The management control literature also reveals that the traditional three-tier management control system is comprehensive and effective for successfully evaluating the effectiveness of the organisation's activities. However, the researcher disagrees and holds that unless, management control pre-requisites are inserted in the first step in the management control process, it may be difficult to have the organisation's activities successfully evaluated. A critical analysis of the

research problem below would certainly demonstrate that a comprehensive management control system which considers; pre-requisites, standards, techniques and corrective management actions is important for the successful evaluations of any organisation's activities. It is thus hypothesized that;

- $\mathbf{H_0}$: The application of appropriate corrective and improvement management actions would result into improving performance of the South African Public Health Care System.
- $\mathbf{H_1}$: There is no nexus between the application of appropriate corrective and improvement management actions and improving performance of the South African Public Health Care System.

In order to determine whether the hypothesised model fits the sample data, the next sections not only examine the methodology which was used in the study, but also analysis and discussions of the findings.

## 3. METHODOLOGY (CONFIRMATORY FACTOR ANALYSIS)

In order to obtain sample data which could be used to test the fitness of the hypothesized public health care management control model, 4776 public health hospitals and clinics combined were considered as the target population for the study. The application of cluster sampling resulted into the dividing of this target population according to the nine South African provinces; Eastern Cape (872 public health facilities), Free State (330), Gauteng (469), Kwa-Zulu Natal (700), Limpopo (707), Mpumalanga (419), Northern Cape (183), Northwest (507), Western Cape (589). Whilst considering Hair et al.'s (2010:102) assertion that the valid sample size for a factor analysis should be 100 or larger, Cochran (1963:75)'s formula ; $\text{no} = \frac{\text{Z}^2\text{PQ}}{\text{e}^2}$, was used for determining the appropriate and valid sample size for this population size (4, 776). Using; $\text{no} = \frac{\text{Z}^2\text{PQ}}{\text{e}^2}$, $Z^2$= 1.96 (as derived from the Z- Table; 95% confidence level), assume q= .5, p=.5 (maximum variability), and e = is the level of precision which in this study is ±7%. $\text{no} = \frac{(1.96)^2\,(.5)(.5)}{(.07)^2} = \frac{3.8416\,x\,0.250}{0.0049}$ = 196 Sample Respondents (But was rounded up for 200 respondents). In addition, Yamane (1967:886)'s formula; $\text{no} = \frac{\text{N}}{1 + \text{N}(\text{e})^2}$, was applied to assess whether it would result into the same above stated sample size. In Yamane (1967:886)'s formula, no is the sample size, N is the population size =4776, and e is the level of precision =7%. Therefore, $\text{no} = \frac{4776}{1 + 4776\,(0.07)^2}$ =204, however in this study it was rounded up for 200 sample respondents. After determining the valid sample size, the sample data was collected from 200 respondents in Mpumalanga and Gauteng Provinces using a five point Likert Scale measurement instrument. A Cronbach Alpha analysis using $\text{a} = \frac{\text{rk}}{[1 + (\text{k}-1)\text{r}]}$ resulted into 0.9, and was construed to confirm the validity and reliability of the measuring instrument.

Despite the fact that AMOS Version 20 of the SPSS (Statistical Programme for Social Sciences) was used in the data analysis, assessments were mainly restricted to analysis of Chi-square values, and the alternative fit indices (modification indices) in order to determine whether hypothesized theory fits the sample data. The main modification indices which were used included; The Root Mean Square Error of Approximation (RMSEA), Normed Fit Index (NFI), Tucker-Lewis Index (TLI), and Comparative Fit Index (CFI). The findings were as presented and discussed in the next section.

## 4. FINDINGS AND DISCUSSIONS

Deriving from the four main constructs which are hypothesized in the model indicated in Figure 1, and the above stated hypothesis, the findings of the study were as follows.

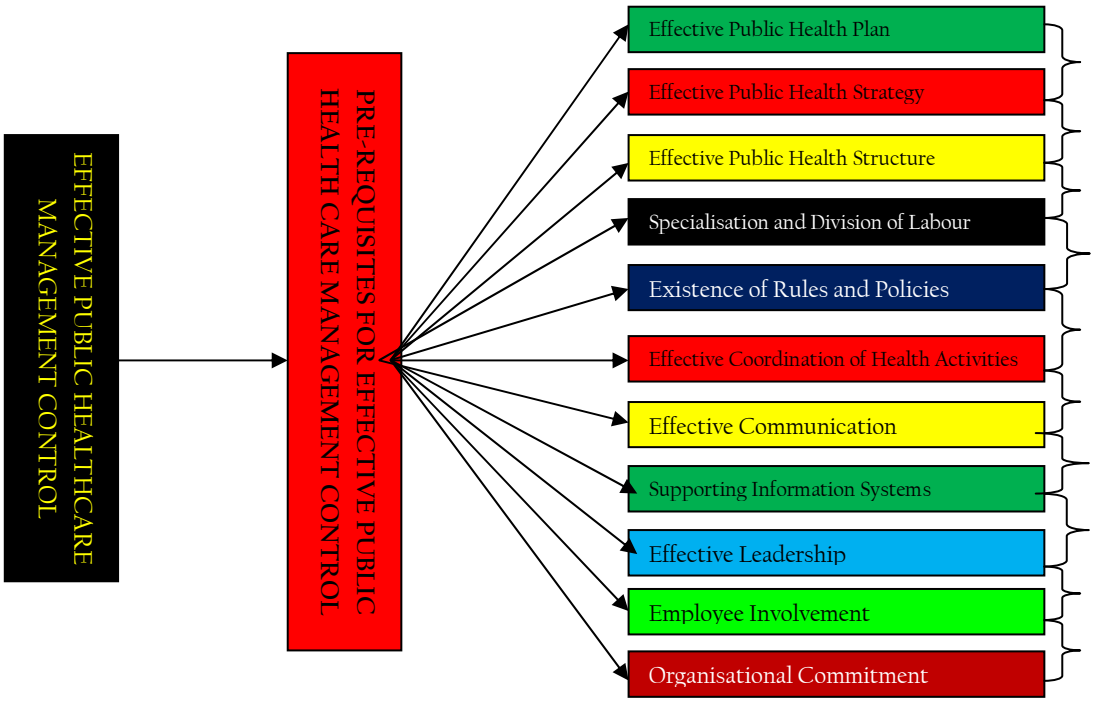
### 4.1 Variables Measuring the Pre-requisites for Effective Public Health Care Management Control System

This construct was aligned to the first research hypothesis which states;

- $\mathbf{H_0}$: Considering certain essential pre-requisites would result into successful implementing of a public healthcare management control system in the South African Public Health Care System.
- $\mathbf{H_1}$: There is no link between considering certain essential pre-requisites and resulting successful implementing of a public healthcare management control system in the South African Public Health Care System.

This hypothesis is replicated and elaborated in Figure 2. It states that the effectiveness any health care management control mechanism is determined by the extent to which certain essential management control pre-requisites are considered.

**Figure 2: Hypothesis 1: The Pre-requisites for Effective Public Health Care Management Control System**




As illustrated in Figure 2, these prerequisites are; effective public health plan, strategy, public health structure, specialisation and division of labour, existence of rules and policies, effective activities' coordination, communication, supporting information systems, leadership, employee involvement, and organisational commitment. However, the Chi-square ($x^2$) of 87 (df=44) is too large to render the conclusion that the observed variables in this construct fit well with the common factor (management control prerequisites) possible. In other words, as per this obtained value of the chi-square the null hypothesis that the hypothesized public health care management control model fits the sample data is rejected. Despite the fact that the chi-square value of 87 indicates that there is lack of fit, the findings on standardized regression weights (factor loadings) which are contained in Table 1 indicate that a number of the observed variables in this construct significantly load on the common factor. The variables loading significantly include; health plan (.38), health care strategy (.31), health care structure (.16), specialization and division of labour (.39), health care rules and policies (.18), coordination of health activities (.14), communication (.34), information systems (.74), leadership (.36), and organizational commitment (.77). Only employee involvement showed a weak relationship with the common factor as it loaded at -.13, and directly indicates that there is no relationship between employee involvement and its use as an essential management control prerequisite.

Table 1: Chi-Square, Standardized Regression Weights (Factor Loadings) and Square Multiple Correlation Coefficient ($R^2$)

| Chi-square = 86.728; Degrees of freedom = 44; Probability level = .000 | | |
|---|---|---|
| Standardized Regression Weights (Factor Loadings) | Measurement Variables (Control Prerequisites) | Factor Loadings (Standardized Regression Weights) |
| | Health Plan | .38 |
| | Health Strategy | .31 |
| | Health Structure | .16 |
| | Specialization | .39 |
| | Rules and Policies | .18 |
| | Coordination of Activities | .14 |
| | Communication | .34 |
| | Information Systems | .74 |
| | Leadership | .36 |
| | Employee Involvement | -.13 |
| | Organizational Commitment | .77 |
| | | |
| Squared Multiple Correlation Coefficients ($R^2$) | Measurement Variables (Control Prerequisites) | Squared Multiple Correlation Coefficient ($R^2$) |
| | Health Plan | .15 |
| | Health Strategy | .09 |
| | Health Structure | .03 |
| | Specialization | .16 |
| | Rules and Policies | .03 |
| | Coordination of Activities | .02 |
| | Communication | .12 |
| | Information Systems | .54 |
| | Leadership | .13 |
| | Employee Involvement | .02 |
| | Organizational Commitment | .59 |
| | | |

Whilst using the results of standardized regression weights, one would argue that the findings on this construct confirm the first hypothesis that the effectiveness of a public health care management control model it is determined by the extent to which certain essential prerequisites are considered. It is nevertheless important to note that the standardized regression weights can be used to assess the fitness of this construct only to a limited extent. This is because in the Squared multiple correlations, it is indicated that certain observed variables are not significantly explained by the common factor. For instance, it is noted in Table 1 that this construct explains 15% of the variance in health plan, 16% for specialization and division of labour, 12% for communication, 54% for information systems, 13% for leadership, and 59% for organizational commitment. On the other hand Table 1 indicates that the common factor is poorly explained with an $R^2$ of .09 of the variance in health strategy, .03 for health structure, .03 for health rules and policies, .02 for coordination of health activities (poorest of all ), and .02 for employee involvement. This is not surprising considering that by scoring a standardized regression weight of -.13, employee involvement did not indicate any form of significant relationship with this construct.

Nevertheless, as much as the results of the standardized regression weights indicated that there are significant relationships between the observed variables in this construct and the common factor, the fact that the chi-square value did not confirm that the hypothesized theory fits the sample data renders the first hypothesis for this study not proved. In order to prove the first hypothesis, alternative fit indices which are not prune to the variations in sample sizes were used, and the findings were as contained in Table 2.

Table 2: Modification Indices (Alternative Fit Indices)

| **Modification Indices (Alternative Fit Statistics)** | **Obtained Value** | **Interpretation** |
|---|---|---|
| GFI ( Acceptable if falls between 0 and 1) | .86 | Acceptable |
| RMR (Root Mean Residual, acceptable if falls between -4.0 and +4.0) | .06 | Acceptable |
| NFI (Normed Fit Index, acceptable if falls between 0 and 1) | .52 | Acceptable |
| TLI (Tucker Lewis Index, acceptable if it falls between 0 and 1) | **.**58 | Acceptable |
| CFI (Comparative Fit Index, acceptable if falls between 0 and 1) | **.7** | Acceptable |
| RMSEA (Root Mean Square Error of Approximation, acceptable if falls between 0.05 and 0.08) | **.**09 | Unacceptable |

In the first instance, Table 2 indicates that the GFI analysis resulted into .86, which if interpreted in the context of Bollen's (2007:219) argument, one would conclude that the result of .86 falls between 0 and 1, and can be stated that it implies that the hypothesized public health care management control model fits the sample data. Meanwhile the Root Mean Residual (RMR) of .06 falls between -4.0 and + 4.0, and would suggest that the model fits the sample data. The fitness of the model is further reflected in the fact that the Normed Fit Index (NFI) of .52, the Tucker Lewis Index (TLI) of .58, and the Comparative Fit Index (CFI) of .7, fell in between 0 and 1. Whereas, this argument is in line with the argument of Haire et al (2006) that NFI, TLI AND CFI indicates a model fitness if it results into the figure falling in between 0 and 1, it is imperative to note that the Root Mean Square Error of Approximation (RMSEA) of .09 exceed 0.08, and therefore fell outside the cut off points which Haire et al (2006) indicated to be between 0.05 and 0.08.

Although, the RMSEA did not confirm the null hypothesis that the observed variables in this construct fit the sample data, it is clear that a number of the alternative fit indices have proved that the effective implementation of a public healthcare management control model is determined by the extent to which certain essential variables are considered. In other words, the results of the analysis rhyme with the views in the secondary findings which indicate that health plans, mission statements, goals, and objectives guide the evaluation of whether activities are not only being executed in the way which are in accordance with the prescribed plans, but also whether the activities will lead to the achieving of the desired strategic objectives, goals and missions. Not only is the implementation of a management control mechanism determined by the existence of clear plan, mission, goals and objectives, but it is also noted in the literature review that the existence of effective; strategy, structure, specialisation and division of labour, existence of rules and policies, effective activities' coordination, communication, supporting information systems, leadership, employee involvement, and organisational commitment. Besides the considering of essential management control prerequisites, it is also hypothesised that the effectiveness of the public health care system is determined by the extent to which the expected public health care standards are clearly defined.

**4.2 Variables Measuring the Expected Public Health Care Standards**

One of the gist of the assumption underpinning this study is that the considering of the above indicated management control prerequisites lays the foundation for the setting of clear standards which can guide the later monitoring and evaluations of public health care activities. For instance, it was noted in the secondary findings that things like employee involvement enable employees to be consulted and involved in the standard setting. This subsequently enhances their understanding and commitment to ensure that the activities are accomplished according to the prescribed standards. Meanwhile variables such as leadership were on the other hand noted to influence compliance with standards, in that leadership provides guidance as to how activities must be executed accordance to indicated standards to render the achievement of desired strategic objectives and goals possible. In other words, theories seem to explain that there is a significant direct positive relationship between the considering of essential management control prerequisites and the successful accomplishment of activities according to the prescribed standards. It was on that basis that it was hypothesized in this study the setting of effective standards is one of the constructs determining the successful implementation of any public health care management control model. The second research hypothesis was aligned to the second construct in the hypothesized public health care management control model, and it reads;

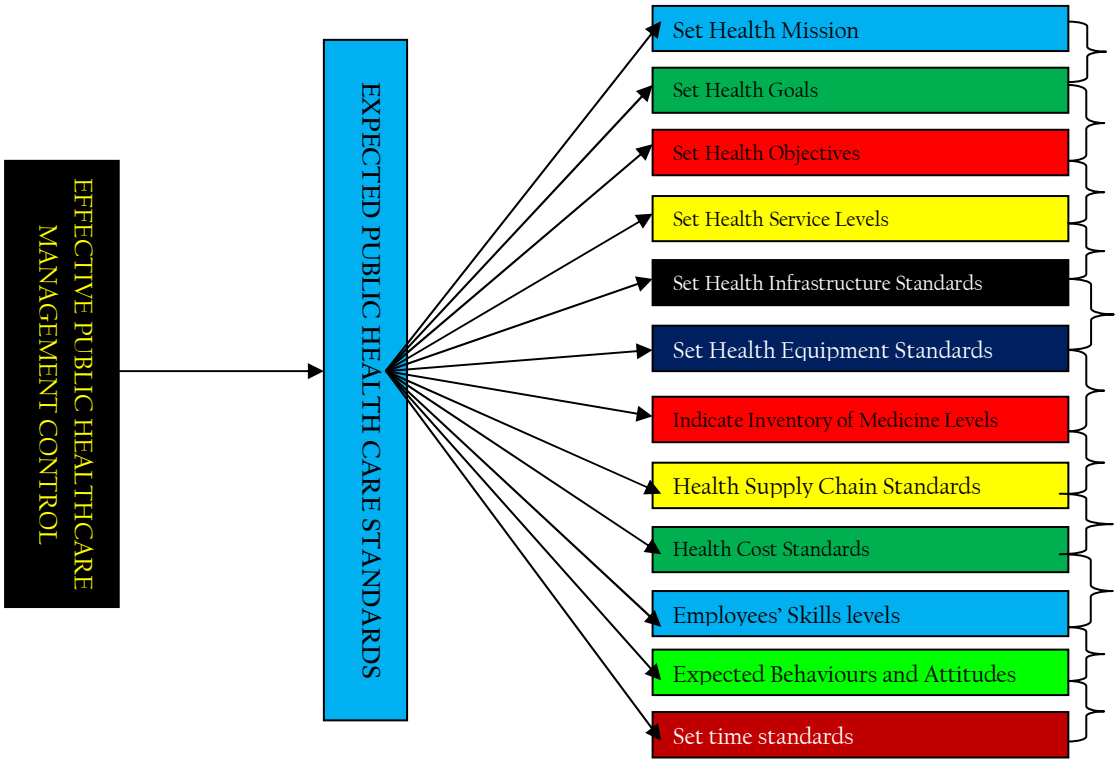
- $\mathbf{H_0}$: Setting appropriate expected performance standards would determine the successful implementing of a public healthcare management control system in the South African Public Health Care System.
- $\mathbf{H_1}$: There is no link between setting appropriate expected performance standards and the successful implementing of a public healthcare management control system in the South African Public Health Care System.

As demonstrated in Figure 3, it is argued that the effectiveness of public health care standards is measured by variables encompassing; the existence of clear and well defined health mission statement, goals, and objectives. The outline of clear expected health service levels, infrastructural standards, equipment standards, medicine

inventory levels, health supply chain standards, cost standards, skills' levels, expected attitudes and behaviours, and time standards. In terms of standardized regression weights, the prescription on the standards on expected employees' behaviours and attitudes registered the highest significant factor loading of .93. It is further indicated in Table 3 that the common factor (standards setting) explains about 86% of the variance in employees' behaviours and attitudes.

Generally the findings seem to imply that employees' attitudes and behaviours is one of the main areas in which keen attention must be paid during standard setting. It is easy for one to find logic in such a finding, considering that without positive or appropriate employees' behaviours and attitudes, however perfectly the health equipments, infrastructure, service and other standards might be, improving public health care performance may not easily be realized. This is because, in the literature review, it is noted that 99% of the activities in the organization are accomplished by human beings, and therefore the kinds of behaviours and attitudes that they display are essential for the successful accomplishment of allocated tasks and responsibilities in accordance to the prescribed standards.

**Figure 2: Hypothesis 2: Expected Public Health Care Standards**




Although the obtained chi-square ($x^2$) of 166.6 (df=54) indicate that most of the observed variables do not explain the effectiveness of a public health care standard setting, it is further indicated in Table 3 that the variables that loaded significantly on the common factor include; public health care objectives (.23), health equipment standards (.41), inventory of medicine (.39), supply chain standards (.39), health cost standards (.29), and skills levels (.31). The observed variables with low factor loadings included; health service levels (-.02), infrastructure standards (.12), health goals (.13), and time standards (.15). Despite the fact that most of the observed variables significantly loaded on the common factor, it is further indicated in Table 3, that the result of the squared multiple correlation coefficient illustrated that the common factor does not explain the variances in most of the factors. For instance the observed variables which are poorly explained by the common factor include; health goals (.02), health objectives (.05), health service levels (.00), infrastructure standards (.02), health equipment standards (.06), health cost standards (.09), skills levels (.09), and time standards (.02).

Table 3: Chi-Square, Standardized Regression Weights (Factor Loadings) and Square Multiple Correlation Coefficient ($R^2$)

| Chi-square = 166.563; Degrees of freedom = 54; Probability level = .000 | | |
|---|---|---|
| Standardized Regression Weights (Factor Loadings) | Measurement Variables (Control Standards) | Factor Loadings (Standardized Regression Weights) |
| | Health Mission | .84 |
| | Health Goals | .13 |
| | Health Objectives | .23 |
| | Health Service Levels | -.02 |
| | Infrastructure Standards | .12 |
| | Health Equipment Standards | .41 |
| | Inventory of Medicine | .39 |
| | Supply Chain Standards | .39 |
| | Health Cost Standards | .29 |
| | Skills Levels | .31 |
| | Behaviours and Attitudes | .93 |
| | Time Standards | .15 |
| | | |
| Squared Multiple Correlation Coefficients ($R^2$) | Measurement Variables (Control Standards) | Squared Multiple Correlation Coefficient ($R^2$) |
| | Health Mission | .70 |
| | Health Goals | .02 |
| | Health Objectives | .05 |
| | Health Service Levels | .00 |
| | Infrastructure Standards | .02 |
| | Health Equipment Standards | .06 |
| | Inventory of Medicine | .16 |
| | Supply Chain Standards | .16 |
| | Health Cost Standards | .09 |
| | Skills Levels | .09 |
| | Behaviours and Attitudes | .86 |
| | Time Standards | .02 |
| | | |

In other words, the standardized regression weights and the squared multiple correlations coefficient ($R^2$) seem to corroborate the findings in the chi-square ($x^2$) value which points out that there is no relationship of fitness between these observed variables and this construct. Such a view is not only inconsistent with the assertion in the null hypothesis, but also contrary to the views of the authors in the literature review who argued that the effective standard setting is determined by the extent to which costs, infrastructure, equipments, skills, employees behaviours and attitudes, services and stock inventory are considered.

However, it is well indicated in the confirmatory factor analysis literature that the results of chi-square analysis must be sceptically used, since it is usually influenced by the sample sizes used. In that the smaller the sample size, the smaller is the chi-square value which is most likely to be obtained and vice versa. In this study, modification indices were used in order to outwit such challenges. Table 4 illustrates the findings on modification indices which were used in this construct.

Table 3: Modification Indices (Alternative Fit Indices)

| **Modification Indices (Alternative Fit Statistics)** | **Obtained Value** | **Interpretation** |
|---|---|---|
| GFI ( Acceptable if falls between 0 and 1) | .78 | Acceptable |
| RMR (Root Mean Residual, acceptable if falls between -4.0 and +4.0) | .13 | Acceptable |
| NFI (Normed Fit Index, acceptable if falls between 0 and 1) | .49 | Acceptable |
| TLI (Tucker Lewis Index, acceptable if it falls between 0 and 1) | .48 | Acceptable |
| CFI (Comparative Fit Index, acceptable if falls between 0 and 1) | .58 | Acceptable |
| RMSEA (Root Mean Square Error of Approximation, acceptable if falls between 0.05 and 0.08) | .15 | Unacceptable |

Just like in the previous construct, the results of the RMSEA fell outside the prescribed limit of 0.05 and 0.08, in that the result of .15 indicates that there is no fit between the assumed management control theory and the sample data. Generally using the RMSEA of .15, one would state that the null hypothesis is rejected. But such a conclusion would be contrary to the findings in the rest of used modification indices, since it is indicated in Table 3 that the fitness of the model was confirmed by the GFI of .78, RMR of .13, NFI of .49, TLI of .48, and CFI of .58. The findings are generally consonant with the findings of the secondary research as well the research hypothesis which stated that the effectiveness of public health care standards is measured by variables encompassing; the existence of clear and well defined health mission statement, goals, and objectives, the outline of clear expected health service levels, infrastructural standards, equipment standards, medicine inventory levels, health supply chain standards, cost standards, skills' levels, expected attitudes and behaviours, and time standards. The confirmation of the hypothesis that the effectiveness of a public health care standards, is determined by these measured variables is further resonated in the secondary findings which argue that an effective standard determine the successful implementation of control systems, and evaluation of standards in an organization.

Especially, since it was noted in the literature review that a consensus exists among management control experts that standards are the guidelines which help managers determine whether the organisation's activities are going according to plans, and are mostly likely to lead to the achievement of the desired strategic goals and objectives (Brigham & Houston, 2004:647; Weihrich & Koontz, 2005:96; Robbins & Coulter, 2003:498; Robinns & Decenzo, 2001:7; Aurora & Kale, 2008:22). In other words, it is through standards that managers are able to detect deviations and intervene to undertake corrective actions. In order to successfully accomplish this, theories reveal that standards must be set at all critical points (Gupta & Sharma, 2003:11; Courty et al> 2006:321; Gupta & Sharma, 2003:11). These critical points are what constituted the observed variables which were tested in this study, and since the findings using GFI of .78, RMR of .13, NFI of .49, TLI of .48, and CFI of .58 confirmed that the model fits the sample data, it cannot be doubted that the use of this model may lead to significant improvement of the South African public health care performance. However, it is further hypothesized that the setting of effective public health care standards alone will not lead to the improving performance of the South African system, unless if it is accompanied with the devising and implementing of a combination of feed forward, concurrent and post control management control techniques. The next discussions examine the hypothesis and findings on this.

**4.3 Variables Measuring the Expected Public Health Care Management Control Techniques**

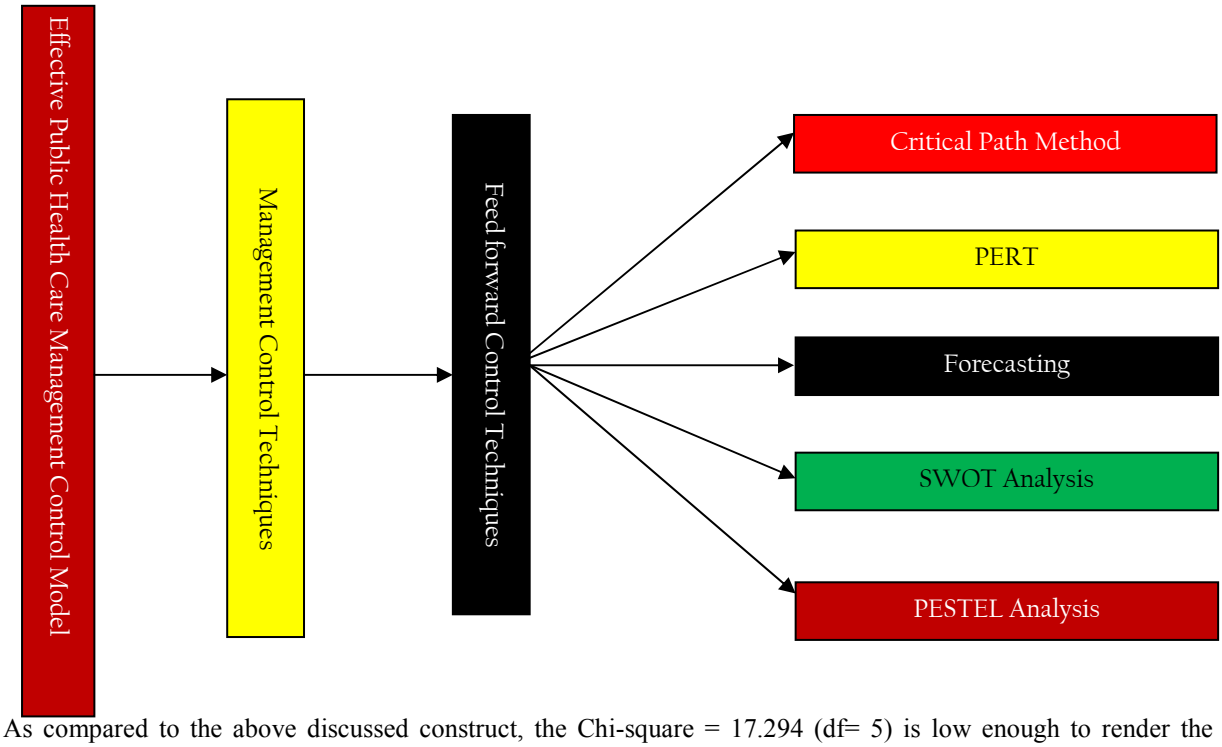
It is hypothesized that the use of a combination of feed forward, concurrent, and post control management control techniques enhance the effective implementation of a public health care management control mechanism. This construct was paired with the third research hypothesis which states;

- $\mathbf{H_0}$: Using a combination of feed forward, concurrent and feedback management control techniques would result into significant improving monitoring and evaluating of activities in the South African public healthcare system.
- $\mathbf{H_1}$: There is no link between using a combination of feed forward, concurrent and feedback management control techniques and resulting significant improving monitoring and evaluating of activities in the South African public healthcare system.

In order to effectively examine the findings on this construct, the discussions were accomplished according three sub-hypothesis; feed forward, concurrent and post control management control techniques. Under the feed forward management control techniques, it was hypothesized that the effective use of management control techniques is measured by the extent to which feed forward control techniques are incorporated as part of a set of the management control techniques. In the sub-hypothesis, it was further postulated that the effectiveness of a feed forward management control techniques is measured by variables encompassing the use of; critical path

method, programme evaluation and review technique, forecasting, SWOT analysis, and PESTEL analysis in the public health sector. The details of this hypothesis and measuring variables are illustrated in Figure 3.

Figure 3; Feed Forward Management Control Techniques




As compared to the above discussed construct, the Chi-square = 17.294 (df= 5) is low enough to render the conclusion that the hypothesized theory fits the sample data possible. In other words, the result of the chi-square analysis can be used to accept the null hypothesis that the effectiveness of a public health care feed forward management control techniques is measured by the use of; critical path method, PERT, forecasting, SWOT analysis, and PESTEL analysis. Although the result of the chi-square analysis rhymes with the assertions in the management control theories that the use of a combination of feed forward management control techniques can result into the improving monitoring and evaluation of organizational activities, the results of standardized regression weights do not corroborate the findings of the chi-square analysis. This is because whereas critical path method significantly loaded on the common factor at .47, SWOT analysis was significant at .94, as PESTEL analysis loaded at .54. On the other hand, PERT with a loading of -.04, and forecasting with a loading of -.14 did not significantly indicate any relationship with the common factor. In other words, the results indicate that the effectiveness of feed forward management control techniques is not measured by the extent to which PERT and forecasting are incorporated as part of the feed forward management control techniques. Such a view is nonetheless inconsistent with the secondary findings which argue that the use of PERT and forecasting enhance the successful use of feed forward management control techniques in the monitoring and evaluating of the organization's activities. The significant factor loadings of critical path method, SWOT analysis, and PESTEL are further resonated in the fact that Table 4 illustrates that this construct explains about 22% of variance in critical path method, 87% of variance in SWOT analysis, and 29% of variance in PESTEL analysis.

Table 4: Chi-Square, Standardized Regression Weights (Factor Loadings) and Square Multiple Correlation Coefficient ($R^2$)

| Chi-square = 17.294; Degrees of freedom = 5; Probability level = .004 | | |
|---|---|---|
| | | |
| Standardized Regression Weights (Factor Loadings) | Measurement Variables (Feed Forward Control Techniques) | Factor Loadings (Standardized Regression Weights) |
| | Critical Path Method | .47 |
| | PERT | -.04 |
| | Forecasting | -.14 |
| | SWOT Analysis | .94 |
| | PESTEL Analysis | .54 |
| | | |
| Squared Multiple Correlation Coefficients ($R^2$) | Measurement Variables (Feed Forward Control Techniques) | Squared Multiple Correlation Coefficient ($R^2$) |
| | Critical Path Method | .22 |
| | PERT | .00 |
| | Forecasting | .02 |
| | SWOT Analysis | .87 |
| | PESTEL Analysis | .29 |

Meanwhile, PERT and forecasting were the poorest indicators among the measured variables in the feed forward management control techniques. With the squared multiple correlation coefficient ($R^2$) of .00 for PERT and .02 for forecasting, one can construe that the effectiveness of feed forward management control techniques is not measured by the use of PERT and forecasting.

Table 5: Modification Indices (Alternative Fit Indices)

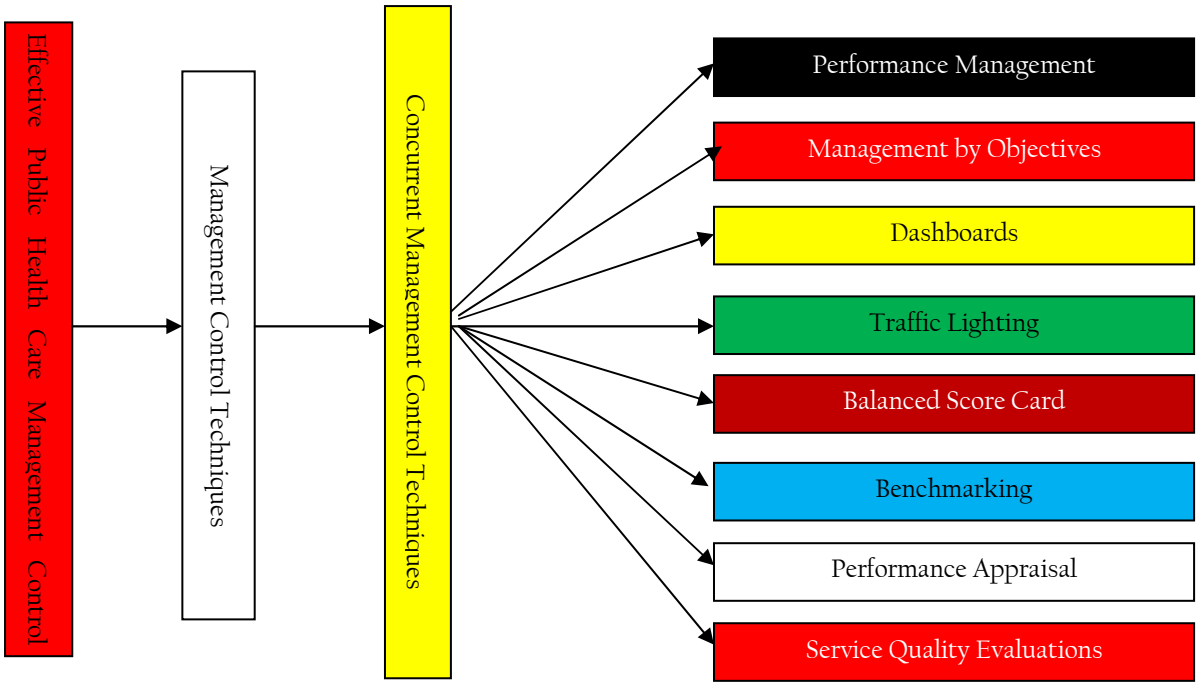
| **Modification Indices (Alternative Fit Statistics)** | **Obtained Value** | **Interpretation** |
|---|---|---|
| GFI ( Acceptable if falls between 0 and 1) | .94 | Acceptable |
| RMR (Root Mean Residual, acceptable if falls between -4.0 and +4.0) | .23 | Acceptable |
| NFI (Normed Fit Index, acceptable if falls between 0 and 1) | .75 | Acceptable |
| TLI (Tucker Lewis Index, acceptable if it falls between 0 and 1) | **.58** | Acceptable |
| CFI (Comparative Fit Index, acceptable if falls between 0 and 1) | .79 | Acceptable |
| RMSEA (Root Mean Square Error of Approximation, acceptable if falls between 0.05 and 0.08) | .16 | Unacceptable |

However, such a conclusion may seem valid only if the results of the standard regression weights and squared multiple correlations coefficient are used. This is because an evaluation of the results on modification indices in Table 5 would suggest that GFI of .94, RMR of .23, NFI of .75, TLI of .58, and CFI of .79 confirmed that this construct with its associated observed variables fit the sample data. Except the RMSEA of .16, GFI, NFI, TLI and CFI indicate that the null hypothesis that the use of different feed forward management control techniques enhances the effective monitoring and evaluating of the South African public health care activities is accepted. It is clear in the management control theories that the use of management control techniques is never effective, unless if a combination of feed forward, concurrent and post control techniques are used. Such a view was shared in this study, and it was the basis that the second sub-hypothesis was formulated in this construct.

**Concurrent Management Control Techniques**

It is postulated in this sub hypothesis that the concurrent management control techniques is measured by the use of; dashboards, traffic lighting, balanced scorecard, performance management, performance appraisal, benchmarking, management by objectives, and service quality evaluations in the public health sector.

**Figure 4; Concurrent Management Control Techniques**




It is indicated in Table 6 that the Chi-square of 27.439 ( df= 20) is too large to state that the observed variables which are hypothesised in Figure 4 fit the sample data. Except for performance appraisal and service quality evaluations, it is indicated in Table 6 that; performance management (.46), management by objectives (.36), dash boards (.43), traffic lighting (.58), balanced scorecard (.24), and benchmarking (.54) significantly loaded on the common factor. In other words, the standard regression weights indicated that the effectiveness of concurrent management control techniques is determined by all the variables which are hypothesized in Figure 4, except for performance appraisal and service quality evaluations.

Table 6: Chi-Square, Standardized Regression Weights (Factor Loadings) and Square Multiple Correlation Coefficient ($R^2$)

| Chi-square = 27.439; Degrees of freedom = 20; Probability level = .123 | | |
|---|---|---|
| Standardized Regression Weights (Factor Loadings) | Measurement Variables (Concurrent Control Techniques) | Factor Loadings (Standardized Regression Weights) |
| | Performance Management | .46 |
| | Management By Objectives | .36 |
| | Dash Boards | .43 |
| | Traffic Lighting | .58 |
| | Balanced Scorecard | .24 |
| | Benchmarking | .54 |
| | Performance Appraisal | .03 |
| | Service Quality Evaluations | .09 |
| | | |
| Squared Multiple Correlation Coefficients ($R^2$) | Measurement Variables (Concurrent Control Techniques) | Squared Multiple Correlation Coefficient ($R^2$) |
| | Performance Management | .21 |
| | Management By Objectives | .13 |
| | Dash Boards | .18 |
| | Traffic Lighting | .34 |
| | Balanced Scorecard | .06 |
| | Benchmarking | .29 |
| | Performance Appraisal | .00 |
| | Service Quality Evaluations | .01 |
| | | |

The squared multiple correlations coefficient also confirm the findings of the standardized regression weights that the variance in; performance management (.21), management by objectives (.13), dash boards (.18), traffic lighting (.34), balanced scorecard (.06), and benchmarking (.29) are significantly explained by the common factor.

Table 7: Modification Indices (Alternative Fit Indices)

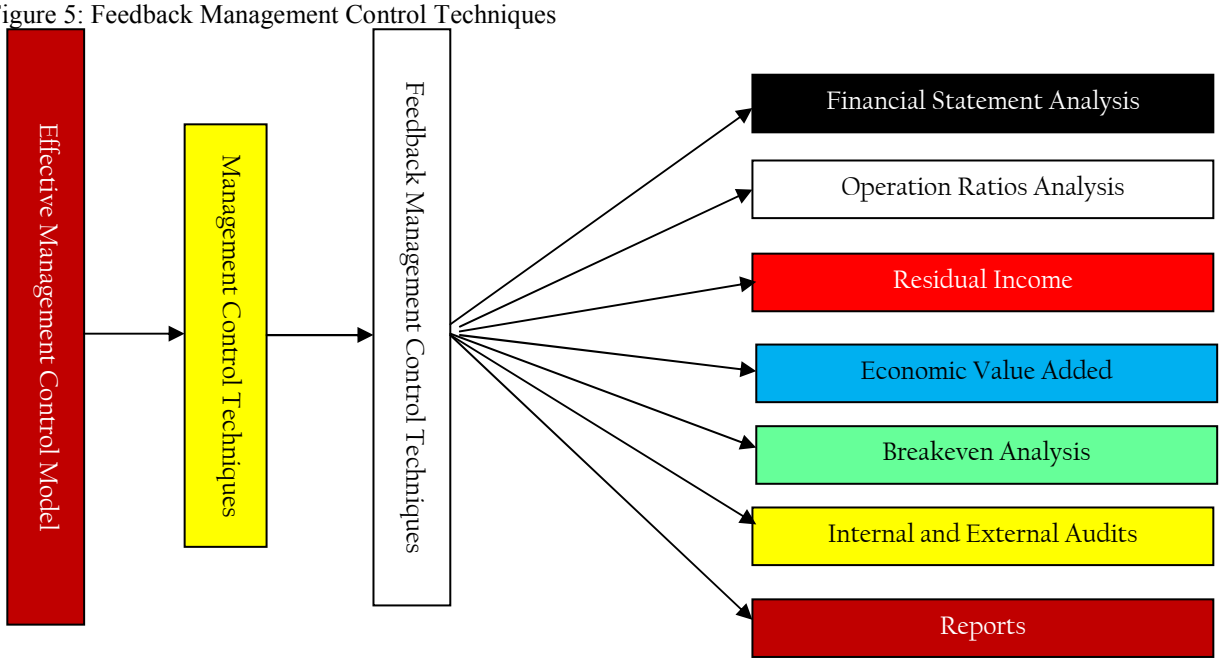
| **Modification Indices (Alternative Fit Statistics)** | **Obtained Value** | **Interpretation** |
|---|---|---|
| GFI ( Acceptable if falls between 0 and 1) | .94 | Acceptable |
| RMR (Root Mean Residual, acceptable if falls between -4.0 and +4.0) | .13 | Acceptable |
| NFI (Normed Fit Index, acceptable if falls between 0 and 1) | .62 | Acceptable |
| TLI (Tucker Lewis Index, acceptable if it falls between 0 and 1) | **.76** | Acceptable |
| CFI (Comparative Fit Index, acceptable if falls between 0 and 1) | .83 | Acceptable |
| RMSEA (Root Mean Square Error of Approximation, acceptable if falls between 0.05 and 0.08) | .06 | Acceptable |

However, after a thorough review of the literature on strategic management controls, one would find it difficult to agree with the findings which are contained in Table 6, since it is indicated that performance appraisal and service quality evaluations are some of the core concurrent management control techniques which organizations can hardly operate without. Such a view is more consonant with the findings of modification fit indices which indicated that GFI (.94), RMR (.13), NFI (.62), TLI (.76), CFI (.83), and RMSEA (.06) confirm the null hypothesis that the assertions in this construct fit the observed sample data. The details of the medication fit indices are contained in Table 7. Although it is indicated that this construct is not explained by performance appraisal and service quality evaluations, as reflected in Table 7, the results of the modification fit indices indicate that the construct and all its observed variables fit the sample data. In other words, the findings of the modification fit indices are more consonant with the secondary findings as compared to the results of the chi-square, standardized regression weights and squared multiple correlations coefficient.

**Feedback Management Control Techniques**

It is however, further hypothesized that the effective use of management control techniques is not determined by the use feed forward and concurrent management control techniques, but also be the use of post control techniques.

Figure 5: Feedback Management Control Techniques




In effect, it is argued that the effectiveness of feedback management control techniques is measured by the use of; Budgets, Operating Ratios, Residual Income in the Public Health Sector, Economic Value Added, Break-Even Analysis, Internal Audit Reports, and External Audit Reports in the South African public health sector. The details of this sub-hypothesis are explained in Figure 5. However, with a large Chi-square value of 23.8, Degree of freedom = 14, and Probability level = 049 it is unlikely that this null hypothesis will be accepted.

Table 8: Chi-Square, Standardized Regression Weights (Factor Loadings) and Square Multiple Correlation Coefficient ($R^2$)

Chi-square = 27.439; Degrees of freedom = 20; Probability level = .123

| Standardized Regression Weights (Factor Loadings) | Measurement Variables (Post Control Techniques) | Factor Loadings (Standardized Regression Weights) |
|---|---|---|
| | Budgetary Controls | .45 |
| | Financial Statement Analysis | .52 |
| | Operating Ratios Analysis | .49 |
| | Reports | .07 |
| | Economic Value Added | .32 |
| | Break-Even Analysis | .64 |
| | Internal and External Audits | .43 |
| | | |
| | | |
| Squared Multiple Correlation Coefficients ($R^2$) | Measurement Variables (Post Control Techniques) | Squared Multiple Correlation Coefficient ( $^2$) |
| | Budgetary Controls | .21 |
| | Financial Statement Analysis | .27 |
| | Operating Ratios Analysis | .24 |
| | Reports | .01 |
| | Economic Value Added | .10 |
| | Break-Even Analysis | .41 |
| | Internal and External Audits | .18 |
| | | |

The standardized regression weights for; budgetary controls (.45), financial statement analysis (.52), operating ratios (.49), economic value added (.32), break even analysis (.64), and internal and external audits (.43) indicate that there were significant factor loading on the common factor. The squared multiple correlation coefficient ( $^2$) revealed that budgetary controls (.21), financial statement analysis (.27), operating ratios (.24), economic value

added (.10), break even analysis (.41), and internal and external audits (.18) are explained by the common factor. Except for reports, the results for the standardized regression weights and squared multiple correlation coefficient cannot be used in concluding that the construct fits the sample data. However, when viewed in the light of the results of modification fit indices, one would argue that the null hypothesis in this sub-hypothesis can be accepted. This is because it is indicated in Table 9 that; RMSEA (Root Mean Square Error of Approximation, acceptable if falls between 0.05 and 0.08) of .07, CFI (Comparative Fit Index, acceptable if falls between 0 and 1) of .80, TLI (Tucker Lewis Index, acceptable if it falls between 0 and 1) of .70, NFI (Normed Fit Index, acceptable if falls between 0 and 1) of .63, RMR (Root Mean Residual, acceptable if falls between -4.0 and +4.0) of .21, and GFI ( Acceptable if falls between 0 and 1) .94 imply that the hypothesized theory fits the sample data.

Table 9: Modification Indices (Alternative Fit Indices)

| **Modification Indices (Alternative Fit Statistics)** | **Obtained Value** | **Interpretation** |
|---|---|---|
| GFI ( Acceptable if falls between 0 and 1) | .94 | Acceptable |
| RMR (Root Mean Residual, acceptable if falls between -4.0 and +4.0) | .21 | Acceptable |
| NFI (Normed Fit Index, acceptable if falls between 0 and 1) | .63 | Acceptable |
| TLI (Tucker Lewis Index, acceptable if it falls between 0 and 1) | **.70** | Acceptable |
| CFI (Comparative Fit Index, acceptable if falls between 0 and 1) | .80 | Acceptable |
| RMSEA (Root Mean Square Error of Approximation, acceptable if falls between 0.05 and 0.08) | .07 | Acceptable |

Generally, the modification fit indices in this construct demonstrate that there is a fitness with the sample data, however, it was further hypothesized in this study that the use of control pre-requisites, standards and a combination of public health care management control techniques may not lead to successful monitoring and evaluation of activities in the in the South African public health care system, unless if the entire management control framework is accompanied with outlined measures which can be used to ensure that performance improvements are achieved. Such assertion led to the formulation of the fourth hypothesis, and the findings were as follows.

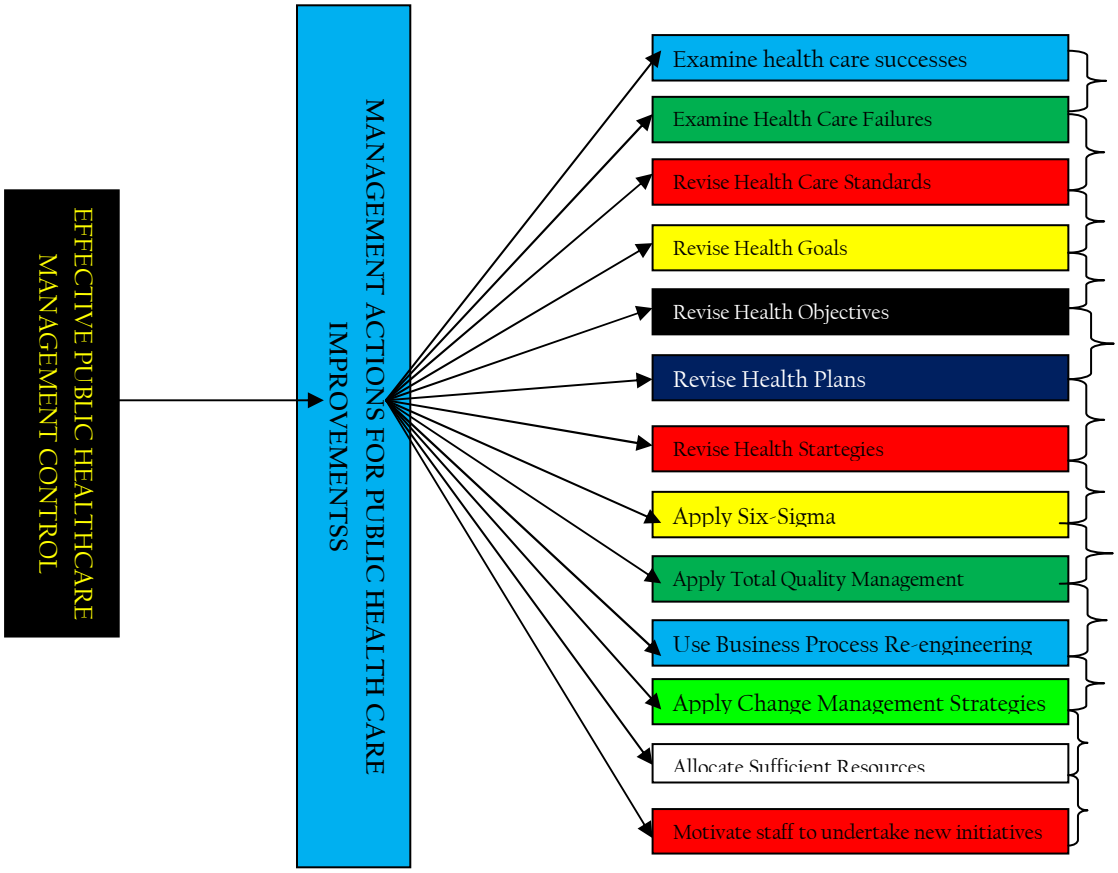
**4.4 Variables Measuring Management Actions for Effective Public Health Care Improvements**

The formulation of the fourth research hypothesis was derived from the fourth construct, and it reads;

- : The application of appropriate corrective and improvement management actions would result into improving performance of the South African Public Health Care System.
- .There is no nexus between the application of appropriate corrective and improvement management actions and improving performance of the South African Public Health Care System.

The core of this hypothesis is that the effectiveness of corrective and improvement management actions in a public health care management control model is measured by; examining health care successes and failures, revising health standards, goals, objectives and strategies, the application of six-sigma application, TQM, Business Process Re-engineering, and change management strategies, allocation of sufficient resources and motivating staff to undertake the implemented new improvement initiatives. Figure 6 provides the detailed illustration.

**Figure 6; Hypothesis 4: Management Actions for Public Health Care Improvements**




Although the hypothesis was formulated in line with the views of manay management control experts and authors, the Chi-square of 122.570 (df= 65), indicates that the null hypothesis that the effectiveness of a management control model is determined by the extent to which certain improvement actions are considered is rejected. Nonetheless, as indicated in Table 10 the standard regression weights reveal that most of the observed variables in this construct significantly loaded on the common factor. For instance examining health failures scored .22, revising health standards (.33), revising health goals (.54), revising health objectives (.65), revising health plans (.35), revising health strategies (.24), TQM (.19), Health process re-engineering (.27), and change management strategies (.17). On the other hand, the observed variables with poor factor loading included; health successes (.02), six-sigma (.09), allocation of sufficient resources (.08), and staff motivation (-.42). In terms of the squared multiple correlations coefficient, the variance in the observed variables explained by the common factor were as follows; .11 for revising health standards, revising health goals (.29), revising health objectives (.42), revising health plans (.12), and staff motivation (.18). Those with poor explained variances included; examining health successes (.00), examining health failures (.05), six-sigma (.04), change management strategies (.03), and allocation of sufficient resources (.01). In other words, just like the results of the chi-square analysis, the results of the standardized regression weights and squared multiple correlations do not indicate that the hypothesized theory in this construct fits the sample data.

Table 10: Chi-Square, Standardized Regression Weights (Factor Loadings) and Square Multiple Correlation Coefficient ( $^2$)

| Chi-square = 122.570; Degrees of freedom = 65; Probability level = .000 | | |
|---|---|---|
| Standardized Regression Weights (Factor Loadings) | Measurement Variables (Health Improvement Management Actions) | Factor Loadings (Standardized Regression Weights) |
| | Examine Health Successes | .02 |
| | Examine Health Failures | .22 |
| | Revise Health Standards | .33 |
| | Revise Health Goals | .54 |
| | Revise Health Objectives | .65 |
| | Revise Health Plans | .35 |
| | Revise Health Strategies | .24 |
| | Apply Six-Sigma | .09 |
| | Apply TQM | .19 |
| | Use HPR | .27 |
| | Change Management Strategies | .17 |
| | Allocate Sufficient Resources | .08 |
| | Motivate Staff | -.42 |
| | | |
| Squared Multiple Correlation Coefficients ($^2$) | Measurement Variables (Health Improvement Management Actions) | Squared Multiple Correlation Coefficient ($^2$) |
| | Examine Health Successes | .00 |
| | Examine Health Failures | .05 |
| | Revise Health Standards | .11 |
| | Revise Health Goals | .29 |
| | Revise Health Objectives | .42 |
| | Revise Health Plans | .12 |
| | Revise Health Strategies | .06 |
| | Apply Six-Sigma | .01 |
| | Apply TQM | .04 |
| | Use HPR | .07 |
| | Change Management Strategies | .03 |
| | Allocate Sufficient Resources | .01 |
| | Motivate Staff | .18 |
| | | |

Nevertheless, using the GFI of .85, RMR (.04), NFI (.30), TLI (.29) and CFI (.41), one would argue that the hypothesized theory in this construct fits the sample data. In other words, the null hypothesis that the effectiveness of a public health care management control model is measured by the kinds of improvement measures used is accepted. The findings on this construct rhyme with the secondary findings in which a significant number of authors were noted to have pointed out that that undertaking management actions is the fourth and last step in a management control process (Berry , 2005; Gosh, 2003:422; Gupta & Sharma, 2003:11; Robbins & Coulter, 2003:498).

Table 11: Modification Indices (Alternative Fit Indices)

| **Modification Indices (Alternative Fit Statistics)** | **Obtained Value** | **Interpretation** |
|---|---|---|
| GFI ( Acceptable if falls between 0 and 1) | .85 | Acceptable |
| RMR (Root Mean Residual, acceptable if falls between -4.0 and +4.0) | .04 | Acceptable |
| NFI (Normed Fit Index, acceptable if falls between 0 and 1) | .30 | Acceptable |
| TLI (Tucker Lewis Index, acceptable if it falls between 0 and 1) | **.29** | Acceptable |
| CFI (Comparative Fit Index, acceptable if falls between 0 and 1) | .41 | Acceptable |
| RMSEA (Root Mean Square Error of Approximation, acceptable if falls between 0.05 and 0.08) | .09 | Unacceptable |

These findings also seem to support the argument that the mere review of plans, standards and objectives are inconsistent with the views of a number of authors who stated that corrective actions arising from plan or strategy failures, may depend on the circumstances, the nature of the failures, and whys of failures. Some failures

for instance are significant and continuous to be merely remedied by redrawing goals or standards or objectives. In such situations, organisations can introduce new strategies which are coupled with radical changes in order to realise a tremendous transformation and a significant improvement in performance. Some of the strategies and the radical changes which these control experts emphasise include; the application of Six-Sigma, Total Quality Management (TQM), Business Process Re-engineering, and Change Management Strategies. If compared with the findings in the primary research, these measures are not different from the indicators which the GFI of .85, RMR (.04), NFI (.30), TLI (.29) and CFI (.41) have confirmed to determine the effectiveness of this construct. The details of the conclusions and recommendations of the study are examined in the next section.

## 5. CONCLUSION

Increasingly public sector organizations are getting under significant pressure from their governments and citizens to improve their performances. Improving public sector's performance signifies improving service delivery, efficiency, effectiveness, and subsequently not only improving standard of living of the population, but also improving economic growth and development. Although the public health system is not exceptional to such increasing governmental and citizens pressure, the assumption underpinning this was that in the absence of an effective public health care monitoring mechanisms, achieving improving public health service efficiency and effectiveness, and subsequently improving public health service delivery would be unlikely. Specifically the gist of monitoring and evaluating problems in the South African public health care system was not to be related to the skewed use of post management control mechanisms, as feed forward and concurrent management control systems are under-utilized. The skewed use of post control system was noted to deprive the South African public health system to not only detect the possibility of future destabilizing factors, but also identify deviations and take corrective actions earlier. But still it was pointed out in the study that the exclusive use of these three management control systems may not lead to effective evaluation and monitoring of activities in the South African public health care system. This is because, as the literature review is noted to have revealed the successful implementation of any management control is not only predicted by the extent to which certain essential prerequisites are considered, but also on the kinds of measures which are adopted for correcting deviations and undertaking the necessary improvement actions. It was on that basis that this study differred from other prior studies and hypothesized a priori health care management control model which highlights that a comprehensive health care management control system can lead to improving performance of a public health care system, if it deals with systematic, chronological, logical and cyclical processes encompassing; identification of key health management control pre-requisites, health care standards, health management control techniques, and implementation management improvement actions. With the exception of most chi-square values, the results of the modification fit indices indicated that the hypothesized priori public health care management model fits the sample data. In that regard, it is recommended that the managers must consider using the public health care management control model which is explained in the next section.

## 6. RECOMMENDATIONS

In order to effectively evaluate and monitor public health care activities, the South African National Health Department must consider aligning its monitoring and evaluating mechanisms according to the steps and/or constructs which are outlined in Figure 1. As illustrated in the inner circle of Figure 1, these steps are; Step 1; Consider the Essential Management Control Prerequisites, Step 2; Set the Expected Public Health Care Standards, Step 3; Use a combination of Feed Forward, Concurrent and Post Control Techniques, and Step 4; Consider using the appropriate health care management improvement measures.

**Step 1; Consider the Essential Management Control Prerequisites;** The South African National Health Department must ensure that all the essential prerequisites are considered prior to the implementing of any of health care management control mechanisms. These prerequisites will be considered if the South African National Health Department ensures that there are; effective public health care plan, public health care delivery strategy, appropriate public health structure, specialisation and division of labour in the public health sector, clear rules and policies which guide how public health care activities must be accomplished, effective coordination of public health activities between provinces, districts, and sub-districts. Other management control prerequisites which must be considered include; effective communication mechanisms, supporting information systems, leadership, employee involvement, and organisational commitment.

**Step 2; Set the Expected Public Health Care Standards;** After considering the essential prerequisites, the South African National Health Department must ensure that there are appropriately set public health care standards. The set public health care standards will be considered effective if it includes the; health mission statement, goals, objectives, health service levels, infrastructural standards, equipment standards, medicine inventory levels, health supply chain standards, cost standards, skills' levels, expected attitudes and behaviours, and time standards.

**Step 3; Use a combination of Feed Forward, Concurrent and Post Control Techniques**; The National Health Department must ensure that all these three types of management control techniques are used all the time.

The feed forward management control techniques which must be used include; Critical Path Method, Programme Evaluation and Review Techniques, forecasting, SWOT Analysis, and PESTEL. Concurrent control techniques would require the use of; performance management, dashboards, traffic lighting, benchmarking, management by objectives, performance appraisals and service quality evaluation techniques. The feedback management control techniques which can be used may encompass; budgetary control techniques, financial statement analysis, analysis of operating ratios, residual income economic value added, break-even analysis, internal audits, external audits, and reports' use.

**Step 4; Consider using the appropriate health care management improvement measures;** In this step, the National Health Department must first examine the health care successes and failures and later choose the measure which can be applied. The improvement measures which can be used may include; revising health care standards, goals, objectives and strategies, or applying six-sigma, TQM, Business Process Re-engineering, change management strategies, allocation of sufficient resources and motivating staff to undertake new initiatives.

Conclusively, it is important for the National Health Department to note that the monitoring and evaluating in this model is cyclical, and continuous, in that the successful execution of one construct determines the success of the successive constructs. Specifically, the successful incorporation and executions of the first construct (management control pre-requisites) and its sets of underlying variables leads to the successful standards' setting. Well set public heath care standards determine the extent to which the application of management control techniques will easily reveal the deviations. The application of different management control techniques enables all deviations to be determined, so that the appropriate corrective and improvement management actions can be taken. The implementation of new strategic management corrective actions sets the phase for a new process of evaluating and measuring health care activities and the process goes on and on like that.

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