European Journal of Business and Management
ISSN 2222-1905 (Paper) ISSN 2222-2839 (Online)
Vol.8, No.1, 2016

A Confirmatory Factor Analysis of the Integrated Framework of Strategic Healthcare Management Control Techniques

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Abstract

While using confirmatory factor analysis, this study examines the implications of an integrated set of feed-forward, concurrent and feedback management control techniques as a predictor for effective monitoring and evaluation of activities in the South African public healthcare system. Findings imply the results of chi-squared (x^2) analysis and root mean square error of approximation (RMSEA) indicated lack of model fitness. However, most of the incremental fit indices, parsimony-adjusted fit measures, standardized regression weights (factor loadings) and squared multiple correlation coefficient (r^2) highlighted the observed sample covariance matrix to perfectly match the estimated covariance matrix. Against such findings, it was suggested that the managers in the South African public healthcare system must consider adopting a framework providing a coherent galaxy of feed-forward, concurrent and feedback management control techniques. Effective use of such a framework will not only edify the overall effectiveness of activities' monitoring and evaluation, but also the improvement of the performance of the South African public healthcare system.

Keywords: healthcare system; management control techniques; performance

1. Introduction

Different management control techniques play different roles at different levels of the organisational structures. Management control techniques also spawns effectiveness of activities' monitoring and evaluation at varying stages of the operational processes and the processes of strategy implementation (Duening & Ivancevich, 2011:219). In the event of the skewed use of only certain control techniques, the organisational ability to detect deviations at all levels and stages in the process of strategy implementation may therefore tend to be affected (Duening & Ivancevich, 2011:219). Unfortunately, the existing management control theories do not provide a single coherent framework prescribing how different management control techniques interact with each other to titillate the overall effectiveness of management control in the contemporary complex organisations. Such a conceptual deficiency also affects the extent to which managers in the South African public healthcare system are exposed to array of effectively integrated management control frameworks that can be replicated. It is such a limitation that therefore motivates this research to explore different management control theories in order to develop a coherent galaxy of feed-forward, concurrent and feedback management control techniques that can be suggested for improving activities' monitoring and evaluation in the South African public healthcare system.

2. Literature Review

An attempt to understand and link different theories on control techniques to each other implies nevertheless that the three main sets of management control techniques that influence the effectiveness of management control encompass feed-forward, concurrent and feedback management control techniques (Marchesan & Formoso, 2009:66; Marchewka, 2010:39). Prior to strategy formulation and implementation, feed-forward control plays a magnificent role in the assessment and analysis of the previous and present data in order to predict the likely future changes which can distort the successful accomplishment of the organisational activities (Correia & Abreu, 2011:261). The overall effectiveness of feed-forward management control techniques is often enhanced by effective application of techniques such as network analysis, critical path method (CPM), programme evaluation and review technique (PERT), SWOT analysis, forecasting and PESTEL analysis (Correia & Abreu, 2011:261).

Whereas feed-forward management control facilitates the control of activities prior to strategy implementation, concurrent control is undertaken during the actual process of strategy implementation (Gurau & Melnic, 2012:5). The use of concurrent management control techniques influences not only costs' reduction, but also wastes associated with delays arising from major deviations and the ability to accomplish project implementation within the prescribed time period (Pierce & Gardner, 2010:339). The extent to which this can be accomplished more effectively is measured by effective use of the techniques that include performance management, dashboards, traffic lighting, benchmarking, management-by-objectives, performance appraisals and service quality evaluation techniques (Pierce & Gardner, 2010:339).

Unlike feed-forward and concurrent management control techniques, feedback control mechanisms facilitate activities' monitoring and evaluation only after their performance has been completed (Duening & Ivancevich, 2011:219). The common forms of feedback management control techniques encompass budgets, financial statements, ratio analysis, return on investment (ROI), residual income (RI), economic value added (EVA), break- even analysis, internal and external audit (Tripathi & Reddy, 2006:215). Feedback management control mechanisms provide comprehensive and detailed reports that improve the quality of the decisions on the next course of actions that must be undertaken. It therefore enables organisations to efficiently plan and use the available limited resources more efficiently and effectively.

However, feedback management control mechanisms do not provide real-time information to render it possible for the determining of the appropriate corrective and improvement measures that must be undertaken (Marchesan & Formoso, 2009:66). The application of a balanced combination of relevant feed-forward, concurrent and feedback management control techniques therefore enables the weaknesses of one set of techniques to be outplayed by the strengths of the other, and vice versa. Unfortunately, due to lack of a single coherent framework, most willing organisations face the challenge of determining how different management control techniques can be used more seamlessly to moderate the overall effectiveness of management control.

2.1 Conceptual Limitations: Management Control

Although Ouchi (1979:833) and Kaplan and Norton's (1992:4) conceptual frameworks are specifically suitable for activities' evaluation in private sector settings, they are only of minimal effects for activities' monitoring and evaluation in public sector organisations. Despite the fact that Simon's (1995) four levers of control espouses a comprehensive framework of management control techniques, it still falls short of the requirements of an effective integrated framework of strategic management control techniques which can be used for improving monitoring and evaluation in the modern complex public healthcare settings. While doubting whether Kaplan and Norton's (1992:4) "balanced scorecard" is really "balanced", Simon (1995:1) interprets in his "four levers of control" that the effectiveness of a management control model is measured by constructs encompassing; diagnostic control systems, belief and boundary control systems, and interactive control systems. Simon's (1995:1) diagnostic control systems may comprise of the concurrent control techniques.

However, the belief and boundary control systems that comprise of rules, regulations, and established organisational ettiqutes are certainly not control techniques, but rather prerequisites. In a view that echoes Weber (1920) and Fayol's (1925) articulations, Butler and Rose (2011:329) recognise rules, regulations and oragnisational ettquettes as key success factors for control, rather than control techniques. Simon's (1995:1) interactive control systems that empahsise the use of concurrent control techniques (performance appraisals and MBO) and feedback control techniques (budgets and financial statements) also underrate the importance of concurrent control techniques such as benchmarking and service quality evaluations. This implies that Simon (1995:1) outlines only some of the feed-forward, concurrent and feedback management control techniques. As it is illustrated in the research problem statement in the next section, such limitations are not only apparent in management control theories, but also in the actual practices in the South Africa public healthcare system.

2.2 Healthcare Management Control: The South African Public Healthcare System

The evaluation of the National Healthcare Strategic Plan (2013:249) and the report of the Public Service Commission (2013:361) indicate greater preponderance of the managers in the South African public healthcare system to mainly rely on post control systems. As the importance of feed-forward and concurrent management control systems are underestimated. The National Healthcare Strategic Plan (2013) indicates the most commonly used post control techniques to encompass annual reports and budgets. Although Mandal (2011:70) contends that the use of reports and budgets help in the identification of areas of successes and failures at the end of each fiscal year, Lussier (2010:399) reveals that the use of reports and budgets is also associated with shortcomings reflected in the fact that they do not provide real-time information on project failures in the manner the concurrent control mechanisms would do. Lussier's (2010:399) doubt about the reliability of reports and budget controls is echoed in the annual report of the Public Service Commission (2013). The Public Service Commission (2013) highlights the use of reports and budgets as control mechanisms to be associated with risks of the aggregation of problems. It points that practical evidence shows that the information presented to the Heads of Departments (HODs) and the Director General (DGs) is usually summarised and lack details to enable the identification and improvement in critical areas possible.

The administrative and legal mechanisms that are highlighted in the report of the Public Service Commission (2013:361) as the other post-control techniques include; the use of the Office of Auditor-General, the evaluation by the Department of Performance and Evaluations in the President's Office, and the Department of Monitoring and Evaluations located within the Health Department. The legal mechanisms cover; the National Prosecuting Authority (NPA), and the Office of the Public Protector. Whereas Fourie (2007:9) and Baker (2008:13) concur that there is a high notion of "colleagues' protectionisms" under the administrative mechanism, they also point out that legal mechanisms are only effective in instances where there is sufficient evidence that the abuse of office or corruption and embezzlement of funds intended for the implementation of healthcare plans and strategies have taken place. All these limit the ability of the South African public healthcare system to monitor, identify and correct deviations as the strategic public health plans and strategies are implemented.

As the Clinic Supervisor's Manual (2006) indicates, the Health Department as part of its concurrent control techniques also relies on weekly and monthly meetings to review areas needing attention. However, without the use of the accompanying concurrent management control techniques such as dashboard, benchmarking, traffic lighting and balanced scorecard, the identification of all the critical areas requiring immediate corrective actions may not be easy. The WHO Health Systems' Framework (2010) has been widely adopted as the control framework for evaluating different aspects of healthcare system, namely; leadership and governance, healthcare financing, health workforce, medical products and technologies, information and research, and service delivery. Although the use of WHO Health Systems' Framework (2010) would spawn effectiveness of control and improvement of certain aspects of healthcare service delivery, its effectiveness as a management control framework would still be limited.

As compared to the improvement of healthcare management control, WHO Health Systems' Framework (2010) seems more suitable for improving the efficiency of healthcare administration rather than the efficiency of healthcare management control. Instead, the system building blocks prescribed in the WHO Health Systems' Framework (2010) are more or less prerequisites rather than management control techniques. The deficiencies in WHO Health Systems' Framework (2010) are also evident in the World Bank Control Knobs' Framework which as cited in Hsiao and Saidat (2008:2) proposes that the five control knobs for evaluating and improving the performance of a healthcare system include financing, payment, organisation, regulation and behavior. Just like the WHO Health Systems' Framework (2010), the World Bank Control Knobs' Framework (2011) dwells on outlining prerequisites rather than providing a comprehensive management control model which can be adopted for improving monitoring and evaluation of the activities in the South African public healthcare system. To some extent it is the use of such disintegrated control system without an integrated management control framework that explains why authors such as Harrison (2010:2) and Whittaker, Shaw, Spieker and Linegar (2011:3) opine that despite the implementation of public healthcare plans, strategies and programmes, the country still continues to experience poor and inadequate public healthcare services. The need to alleviate the negative implications associated with such conceptual and practical limitations is what motivates this research.

3. Problem Statement

Lack of effective integrated framework healthcare management control techniques not only limits the use of all the required healthcare management control techniques and effectiveness of activities' control, but also the performance of the South African public healthcare system.

4. Purpose of the Research

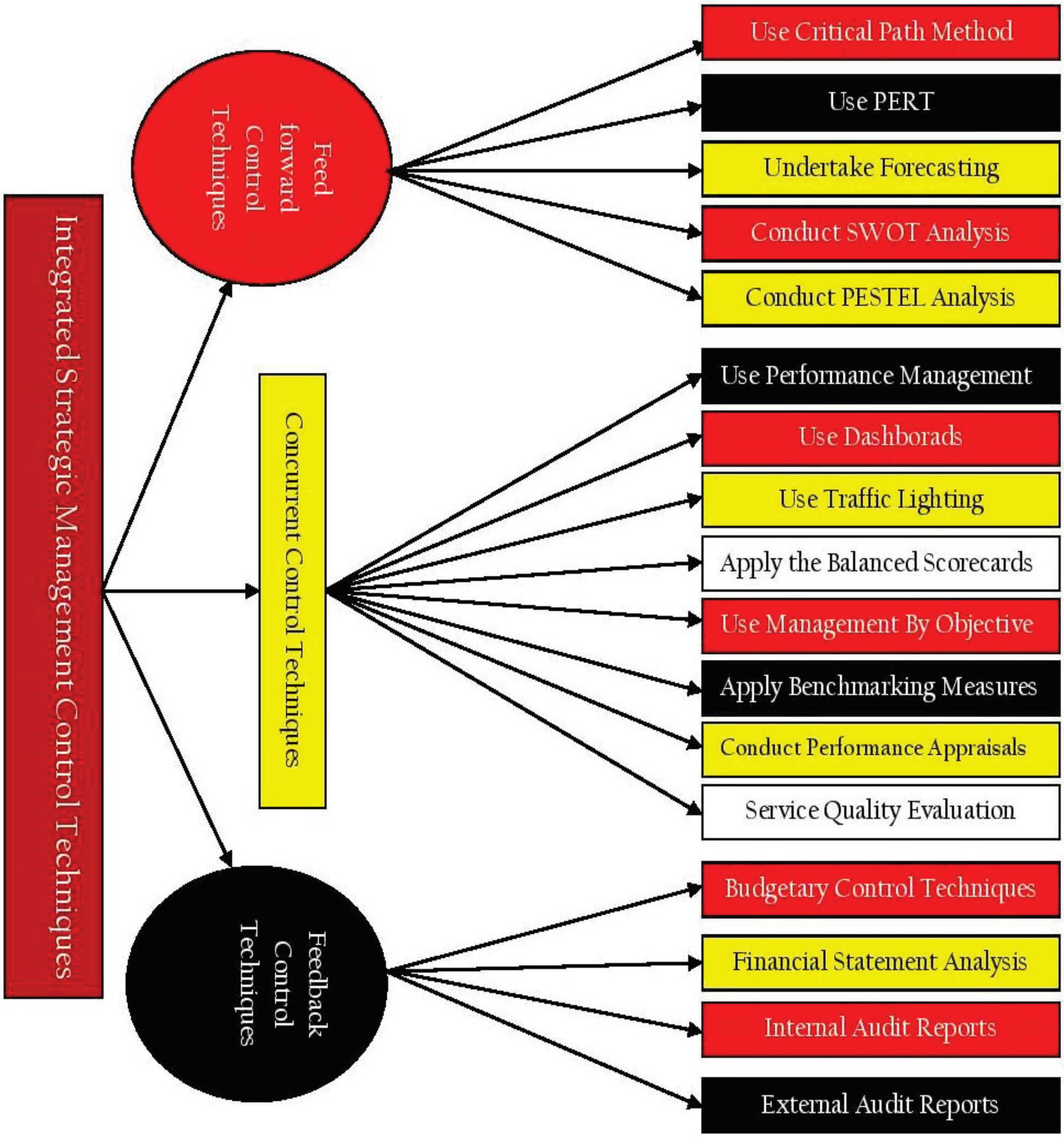
In light of the identified conceptual limitations in management control theories and practical limitations in the South African public healthcare system, the main purpose of this article is to develop an integrated framework of the strategic healthcare management control techniques which can be proposed for improving monitoring and evaluation of the activities in the South African public healthcare system.

5. Research Hypothesis

In order to achieve this overriding research objective, the study starts with the formulation of a thought process in the overriding hypothesis that the application of the a priori integrated multidimensional strategic healthcare management control framework in Figure 1 would significantly influence the successful monitoring and evaluation of the activities in the South African public healthcare system. While drawing from different management control theories and an overview of the practices in the South African public healthcare system, it is posited in Figure 1 that the effectiveness of feed-forward management control is measured by techniques encompassing critical path method, programme review and evaluation techniques, forecasting, SWOT analysis and PESTEL.

It is also highlighted in Figure 1 that the effective application of the concurrent management control techniques is moderated by the underlying variables that include performance management, dashboards, traffic lighting, benchmarking, management-by-objectives, performance appraisals and service quality evaluation techniques. Finally, Figure 1 indicates that the effectiveness of the public healthcare feedback management control is predicted by variables encompassing budgetary control techniques, financial statement analysis, and internal and external audit reports. The process of testing and validating this hypothesised integrated strategic healthcare management control framework was accomplished using confirmatory factor analysis.

Figure 1: ***Integrated framework of the strategic healthcare management control techniques***



Source: Researcher's construct as derived from the interpretation of different management control theories.

6. Methodology

Confirmatory factor analysis was accomplished in the context of Hair et al.'s (2010:94) prescribed four main steps that include; model specification, sample size determination, data collection process, and calculation of estimates and interpretations of indices. With the model and the associated measuring constructs and underlying variables already specified in Figure 1, the second step in confirmatory factor analysis involved determining the sample data against which confirmatory factor analysis was to be based. The District Health Information System (2011) and Statistics South Africa (2012:16) reveal similar figures that indicate that the total number of public healthcare facilities (hospitals and clinics) around the country is about 4 776. Considering the fact that each hospital has a manager and that each clinic has a primary healthcare coordinator or facilitator, the logical interpretation was that the target population of the study which comprises of the public hospital managers and primary healthcare coordinators is 4 776. Using multi-stage sampling involving the application of a combination of cluster sampling and simple random sampling techniques, Mpumalanga and Gauteng were selected as the sample clusters or secondary units (provinces). The effect was that 416 sample respondents were drawn from a total of 824 public healthcare facilities in the selected sample clusters of Mpumalanga and Gauteng. While applying a formula:

$$\frac{N\ (\text{total units of analysis in Mpumalanga and Gauteng}) = 824}{n\ (\text{the Estimated Sample Size}) = 416} = 2,$$

the process of drawing the units into the sample of the public hospital managers and facility managers was accomplished after every 2nd interval from the drawn list of the public healthcare facilities in Mpumalanga and Gauteng until the desired sample size of 416 was achieved.

Primary data collection was accomplished through personal administration using a five point Likert's (1932) scale questionnaire containing scales encompassing; strongly disagree—1, disagree—2, unsure---3, agree---4, and strongly agree---5. The Questionnaire was designed in accordance with the three constructs in Figure 1. Despite the use of a pilot study, a Cronbach's (1951) Alpha analysis result of 0.8 was concluded to be indicating good validity and reliability of the research instrument. The obtained total of the collected 416 sample data was used in the calculation of estimates using AMOS Version 21 of the Statistical Programme for Social Sciences (SPSS). The techniques and indices which were used in the assessment of the fitness of the model included chi-squared (x^2), and the modification indices encompassing Root Mean Residual (RMR), Comparative Fit Index (CFI), Tucker Lewis Index (TLI), Normed Fit Index (NFI) and Root Mean Square Error of Approximation (RMSEA). David's (2014:75) interpretation was applied in the evaluation of whether the results of GFI, PNFI, TLI and CFI were within acceptable limits of 0 and 1. As Wheaton's (1987:2), and Carmnines and McLver's (1981:1) arguments, as cited in Bollen and Davis (2009:523) were used in the analysis of whether RMSEA (Root Mean Square Error of Approximation) fell in the acceptable limit of 0.05 and 0.08.

In addition to the application of chi-squared (x^2) value and these modification indices, the standardized regression weights (factor loadings) were also used in determining how each of the hypothesised variables significantly load onto the hypothesised or common constructs. Within the context of Bollen and Davis' (2009:536) criterion of $\pm.30\ to\ \pm.40$, a loading was considered to be significant if it fell at $\pm.30\ to\ \pm.40$ or above. The squared multiple correlation coefficient (R^2) was used to assess the extent to which the variance in the common factor is explained by the existence of each of the measured variables. In line with Bollen and Davis's (2009:536) prescription, a score of 30% was considered significant. The details of the findings were as presented and discussed in the next section.

7. Results

The presentation of the findings and discussions in this section is accomplished according to the two subsections that include: chi-squared (x^2), incremental fit indices and parsimony-adjusted measures, and standardised regression weights and squared multiple correlations coefficient.

7.1 Chi-squared (x^2), incremental fit indices and parsimony-adjusted measures

Despite the results of standardised regression weights (factor loadings) and squared multiple correlation coefficients (R^2) indicating a good model fitness, chi-squared (x^2) does not indicate good model fitness. Such a view is attributable to the fact that at a df = 27 and significance level of 0.05 (5%), the critical-x^2 limit (as derived from the chi-squared distribution table) is 40.113. Using Wegner's (2011:345) interpretation, chi-squared (x^2) = 53 is greater than x^2-stat = 40.113. This signifies that the model does not fit the observed 416 sample data.

On the basis of the obtained chi-squared (x^2) value indicated in Table 1, the null hypothesis would be rejected and the alternative hypothesis accepted. Such a finding is at par with the interpretation that the application of the a priori integrated multidimensional strategic healthcare management control techniques in Figure 1 would not significantly influence the successful monitoring and evaluation of the activities in the South African public healthcare system.

However, using Hu and Bentler's (1995:22) interpretation, CMIN/df (chi-squared (x^2) divided by the degree of freedom) = 1.9 falls in the ratio of 3 to 1. Such a result can be used to suggest that the model represents a reasonable reproduction of the observed 416 sample data. Even if the chi-squared (x^2) does not directly indicate good model fitness, Hair et al. (2011:426) argue that a chi-squared (x^2) analysis is often susceptible to the influences in sample sizes. Hair et al. (2011:426) explain that an analysis based on higher sample sizes is most likely to result in higher chi-squared (x^2) values and hence the rejection of in some cases a good model (Type 1 Error; the probability of rejecting a true null hypothesis). On the other hand, Hair et al. (2011:426) noted that if the analysis is based on smaller sample sizes, there is a likelihood of obtaining smaller chi-squared (x^2) values, thus accepting a wrong model (Type 11 Error: the probability of accepting a false null hypothesis).

Table 1: Model fitness: chi-squared (x^2) and modification fit indices

Model Fitness: Techniques	Significance (Value)		Interpretation
Chi-squared (x^2) (Using Wegner's (2011:345) interpretation, at a significance level of 0.05 (5%) and a df = 14, the critical- x^2 limit as derived from the Chi-squared Distribution Table would be 16.919)	Chi-squared (x^2) = 53 ; Degree of freedom = 27 ; Probability level = .002; CMIN/DF=1.9 (Using Wegner's (2011:345) interpretation, the decision rule is that the null hypothesis (H_0) would be accepted if x^2-stat falls at or below the upper limit of 40.113, and the alternative hypothesis (H_1) would be accepted and H_0 rejected if x^2-stat falls above 40.113)		Chi-squared (x^2) = 13 and exceeds x^2-stat = 40.113, then, the null hypothesis is rejected) Lack of Model Fitness.
Modification Indices (Alternative Fit Statistical Techniques) (Hu and Bentler's (2006:22) interpretation, GFI, PNFI, TLI and CFI acceptable, if falls in the limit of 0 and 1, and using Wheaton (1987:2), a RMSEA falling between 0.05 and 0.08 with a higher PClose is acceptable)	Modification Indices(Alternative Fit Statistical Techniques)	Significance (Value)	Interpretation
	GFI (Goodness of Fitness Index Acceptable if it falls between 0 and 1)	.97	Acceptable
	RMR (Root Mean Residual, acceptable if falls between -4.0 and +4.0)	.1	Acceptable
	NFI (Normed Fit Index, acceptable if it falls between 0 and 1)	.07	Acceptable
	TLI (Tucker Lewis Index, acceptable if it falls between 0 and 1)	1	Acceptable
	CFI (Comparative Fit Index, acceptable if it falls between 0 and 1)	.00	Acceptable
	RMSEA (Root Mean Squared Error of Approximation, acceptable if it falls between 0.05 and 0.08)	.1 (PClose=.024)	Acceptable

Source: As derived from the results of confirmatory factor analysis using AMOS Version 21 of the Statistical Programme for Social Sciences (SPSS).

In order to circumvent such situations, Hair et al. (2011:426) suggest that it is important to use the alternative modification indices which are not prone to changes in sample sizes. The analysis of Table 1 would suggest that the modification indices which were used in this study include the Goodness of Fitness Index (GFI), Root Mean Residual (RMR), Normed Fit Index (NFI), Tucker Lewis Index (TLI), Comparative Fit Index (CFI) and Root Mean Squared Error of Approximation (RMSEA). Hu and Bentler (1995:22) state that a model is fit and reproduces the observed sample data if GFI, PNFI, TLI and CFI fall between 0 and 1, with figures falling closer to 1, implying better model fitness. In Table 1, GFI=.97, PNFI=.07, TLI = 1 and CFI=.00. Whereas, PNFI=.07 and CFI=.00 do not indicate good fitness, GFI=.97 and TLI = 1 signify that the model fits well with the observed 416 sample data. Contrary to the results of chi-squared (x^2) analysis, GFI=.97 and TLI = 1 support the null hypothesis that the application of the a priori integrated multidimensional strategic healthcare management control techniques in Figure 1 would significantly influence the successful monitoring and evaluation of the activities in the South African public healthcare system. Wheaton (1987:2) argues that RMSEA (Root Mean Squared Error of Approximation) falling between 0.05 and 0.08 with a higher PClose , and Root Mean Residual (RMR) falling in between -4.0 and +4.0) can be considered as acceptable. Although the RMSEA of .1 (PClose=.024) does not indicate good model fitness, the RMR= 1 can be construed within the context of Wheaton's (1987:2) postulations to imply that a set of the hypothesised healthcare management control techniques in Figure 1 reproduces the observed 416 sample data. Such a view is also consonant with the theoretical articulations of Goksoy et al. (2012:89) and Brown (2011:291) that the successful monitoring and evaluation of the modern organisational activities is measured by the extent to which a combination of feed-forward, concurrent and feedback management control techniques is used. Although there is a challenge of fitness when using chi-squared (x^2) and modification indices, the results of the standardised regression weights (factor loadings) and squared multiple correlation coefficients (R^2) in Table 2 and Figure 2 suggest most of the observed variables to significantly load onto the common factor (the use of a balanced combination of the public healthcare management control techniques).

7.2 Standardised regression weights and squared multiple correlation coefficient

Statistically, Hair et al. (2010:102) construe that the rule of thumb provides that factor loadings should be at least $\pm.30\ to\ \pm.40$ or higher in order to confirm the indicators are strongly related to their associated constructs and indicative of construct validity. Using David's (2014:75) prescribed rule of thumb, an evaluation of the findings in Table 2 would indicate that most of the measured variables load quite significantly onto the associated sub-constructs that include feed-forward, concurrent and feedback management control techniques. Under public healthcare feed-forward management control techniques, Table 2 reveals critical path method to load highly at 0.60, programme evaluation and review technique (0.67), forecasting (0.69), SWOT Analysis (0.41), and PESTEL Analysis (0.68). Except for SWOT Analysis which is explained by only 17% of the variance in the common factor (feed-forward control techniques), the squared multiple correlation coefficients (R^2)the critical path method path method is explained by 36% of the variance in the common factor, PERT (45%), forecasting (48%), and PESTEL Analysis (46%). All these reinforce the assertion in the null hypothesis that the use of these techniques (variables) influences effective application of feed-forward public healthcare management control techniques.

Table 2 further confirms the ratiocination in the null hypothesis that the effectiveness of the public healthcare concurrent management control system is measured by performance management (.71 and explained by 50% of the variance in the common factor), and dashboards (.45 and explained by 20% of the variance in the common factor). It also highlights that traffic lighting loads significantly at .52 and explained by 27% of the variance in the common factor, balanced scorecard (.63 and explained by 40% of the variance in the common factor), benchmarking (.60 and explained by 36% of the variance in the common factor), performance appraisal (.65 and explained by 42% of the variance in the common factor) and SERVQUAL (.73 and explained by 53% of the variance in the common factor).

In other words, the results of confirmatory factor analysis in Table 2 and Figure 2 corroborate the assertion in the null hypothesis that the effectiveness of the public healthcare feedback management control system is measured by the variables encompassing budgets (.98 and explained by 96% of the variance in the common factor), internal audits (.33 and explained by 11% of the variance in the common factor), and external audits (.29 and explained by 8% of the variance in the common factor). As much as most of the variables under the public healthcare feedback management control techniques were found to load quite significantly, financial statements did not load significantly and was not explained by the variance in the common factor (public healthcare feedback management control) at all. Nonetheless, the findings in Table 2 do not only support the postulation in the null hypothesis, but also echo Duening and Ivancevich (2009:393), Lussier (2010:399) and Mandal's (2011:106) views that the use of a balanced combination of these techniques enables the weaknesses in the application of the one set of techniques to be outplayed by the strength of the other sets of techniques. Thus, it enhances the organisation's ability to achieve the desired level of performance. Yet, as illustrated in Figure 2, it is also noted that the results of standardised regression weights (factor loadings) and squared multiple correlation coefficients (R^2) echo Koontz and Weihrich's (2010:382) believe that the use of a combination of feed-forward, concurrent and feedback control techniques determines the successful monitoring and evaluation of the modern organisations' activities.

Table 2: Standardised regression weights (factor loadings) and squared multiple correlation coefficients (R^2)

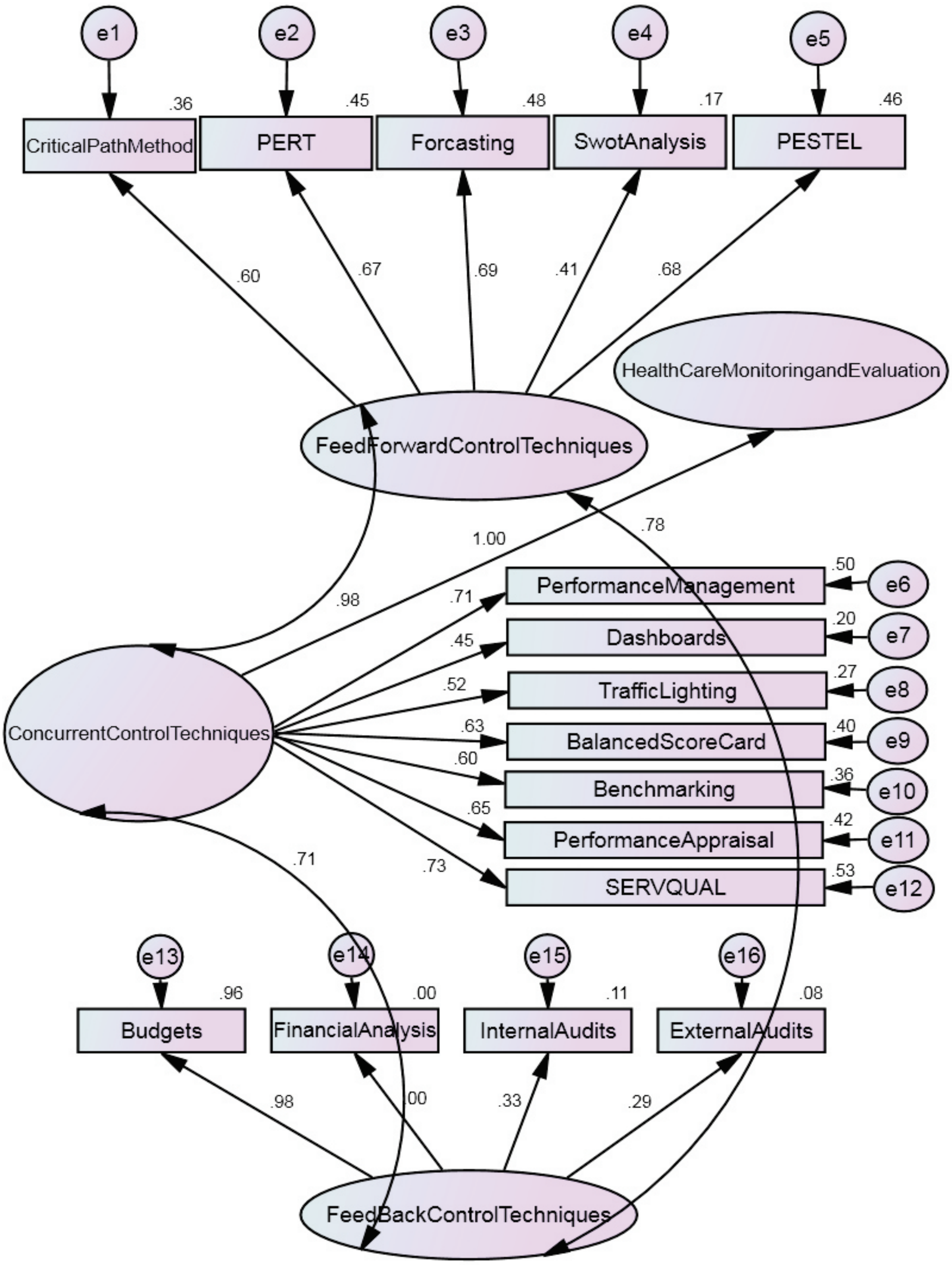
	Variables (Use of a Balanced Combination of Public Healthcare Management Control Techniques)	Significance (Value)	Interpretation
Standardised Regression Weights (Factor Loadings) (Using Bollen and Davis' (2009:536) Interpretation, Significant if falls at $\pm.30\ to\ \pm.40$)	Feed Forward Control Techniques		
	Critical Path Method	.60	Significant
	PERT	.67	Significant
	Forecasting	.69	Significant
	SWOT Analysis	.41	Significant
	PESTEL	.68	Significant
	Concurrent Control Techniques		
	Performance Management	.71	Significant
	Dashboards	.45	Significant
	Traffic Lighting	.52	Significant
	Balanced Scorecard	.63	Significant
	Benchmarking	.60	Significant
	Performance Appraisal	.65	Significant
	SERVQUAL	.73	Significant
	Feedback Management Control Techniques		
	Budgets	.98	Significant
	Financial Analysis	.00	No
	Internal Audits	.33	Significant
	External Audits	.29	Significant
Squared Multiple Correlation Coefficient (R^2) (Using Hair et al.'s (2010:477) interpretation, reject a squared multiple correlation coefficient falling below ±0.3 (30%))	Variables (Use of a Balanced Combination of Public Healthcare Management Control Techniques)	Significance (Value)	Interpretation
	Feed Forward Control Techniques		
	Critical Path Method	.36(36%)	Significant
	PERT	.45(45%)	Significant
	Forecasting	.48(48%)	Significant
	SWOT Analysis	.17(17%)	Less Significant
	PESTEL	.46(46%)	Significant
	Concurrent Control Techniques		
	Performance Management	.50(50%)	Significant
	Dashboards	.20(20%)	Less Significant
	Traffic Lighting	.27(27%)	Significant
	Balanced Scorecard	.40(40%)	Significant
	Benchmarking	.36(36%)	Significant
	Performance Appraisal	.42(42%)	Significant
	SERVQUAL	.53(53%)	Significant
	Feedback Management Control Techniques		
	Budgets	.96(96%)	Significant
	Financial Analysis and Reports	.00	No
	Internal Audits	.11(11%)	Less Significant
	External Audits	.08(8%)	Less Significant

Source: As derived from the results of confirmatory factor analysis using AMOS Version 21 of the Statistical Programme for Social Sciences (SPSS)

The findings in Figure 2 confirm the null hypothesis that using a balanced combination of the feed-forward, concurrent and feedback management control techniques would predict significant improvement in the monitoring and evaluation of the activities in the South African public healthcare system. It is demonstrated in

Figure 2 that the co-relationship between feed-forward and concurrent management control techniques is significant at .98. Using David's (2014:75) ratiocination that a co-relationship between two variables is significant if it falls in the range of $\pm\ 0\ and\ 1$, the finding can be fathomed to imply that effective application of feed-forward management control techniques influences effective application of concurrent management control techniques and vice-versa. This also signifies that the application of concurrent management control techniques influences the application of feedback control techniques just to the same extent that feedback control techniques would influence the application of the concurrent control techniques.

Figure 2: Standardised regression weights and squared multiple correlation coefficients (R^2): healthcare management control techniques



Source: As derived from the results of confirmatory factor analysis using AMOS Version 21 of the Statistical Programme for Social Sciences (SPSS)

It is also illustrated in Figure 2 that feed-forward control techniques influence the successful application of the feedback control techniques and vice-versa. Attributable to this, is the fact that it is indicated in Figure 2 that the co-relationship between the two sub-constructs is significant at .78. On the other hand, it is also highlighted in Figure 2 that the co-relationship between concurrent and feedback management control techniques is significant at. 71. The relationship between the combined effects of application of these three management control techniques and the improvement in monitoring and evaluations of healthcare activities is also noted in Figure 2 to be significant at 1. This implies that the application of concurrent management control techniques influences the application of feedback control techniques just to the same extent that feedback control techniques would influence the application of concurrent control techniques and vice-versa.

Certainly, the findings in Table 1, Table 2 and Figure 2 echo the theoretical postulations in which Koontz and Weihrich (2010:406) are noted to state that a failure to use a combination of these management control techniques significantly affects the organisation's ability to accurately analyse, identify and conceptualise a scenario of all the possible events which may arise and de-stabilise the successful accomplishment of activities, and the achievement of the desired level of performance. Such interpretation also fits neatly into the ratiocination in the null hypothesis of this research that the application of the a priori integrated multidimensional strategic healthcare management control techniques in Figure 1 would significantly influence the successful monitoring and evaluation of the activities in the South African public healthcare system.

8. Discussion

It is though not questionable that this research has fulfilled its main objective which was to develop an integrated framework of the strategic healthcare management control techniques which can be proposed for improving monitoring and evaluation of activities in the South African public healthcare system. Although the results of chi-squared (x^2) did not indicate good model fitness, the analysis of the results of modification indices, standardised regression weights (factor loadings) and squared multiple correlation coefficients (R^2) confirmed the null hypothesis that the use of a combination of feed-forward, concurrent and feedback control techniques would influence the successful monitoring and evaluation of the activities in the South African public healthcare system. No matter how well-crafted the organisation's strategic plan, and comprehensive the expected performance standards may be, the study implies that a failure to create a strategic fit by applying a combination of feed-forward, concurrent and feedback management control techniques can significantly undermine the successful monitoring and evaluation of activities in modern organisations.

The end results are reflected in the difficulty of the organisation to determine the strategic corrective and improvement measures that must be used. It also connotes that the fact that the South African public healthcare system uses mainly feedback management control techniques can undermine its ability to effectively monitor and evaluate activities during the actual processes of strategy implementation. The selection and the integration of appropriate feed-forward, concurrent and feedback management control techniques enhances the use of the strengths of one set of the strategic management control techniques to outplay the weaknesses which are associated with the other sets of management control techniques, and vice versa. The application of feed-forward management control techniques enables the organisational executives and managers scan the environment, analyse past data and present data to assess the likely future events that are most likely to interfere with the successful implementation of strategies.

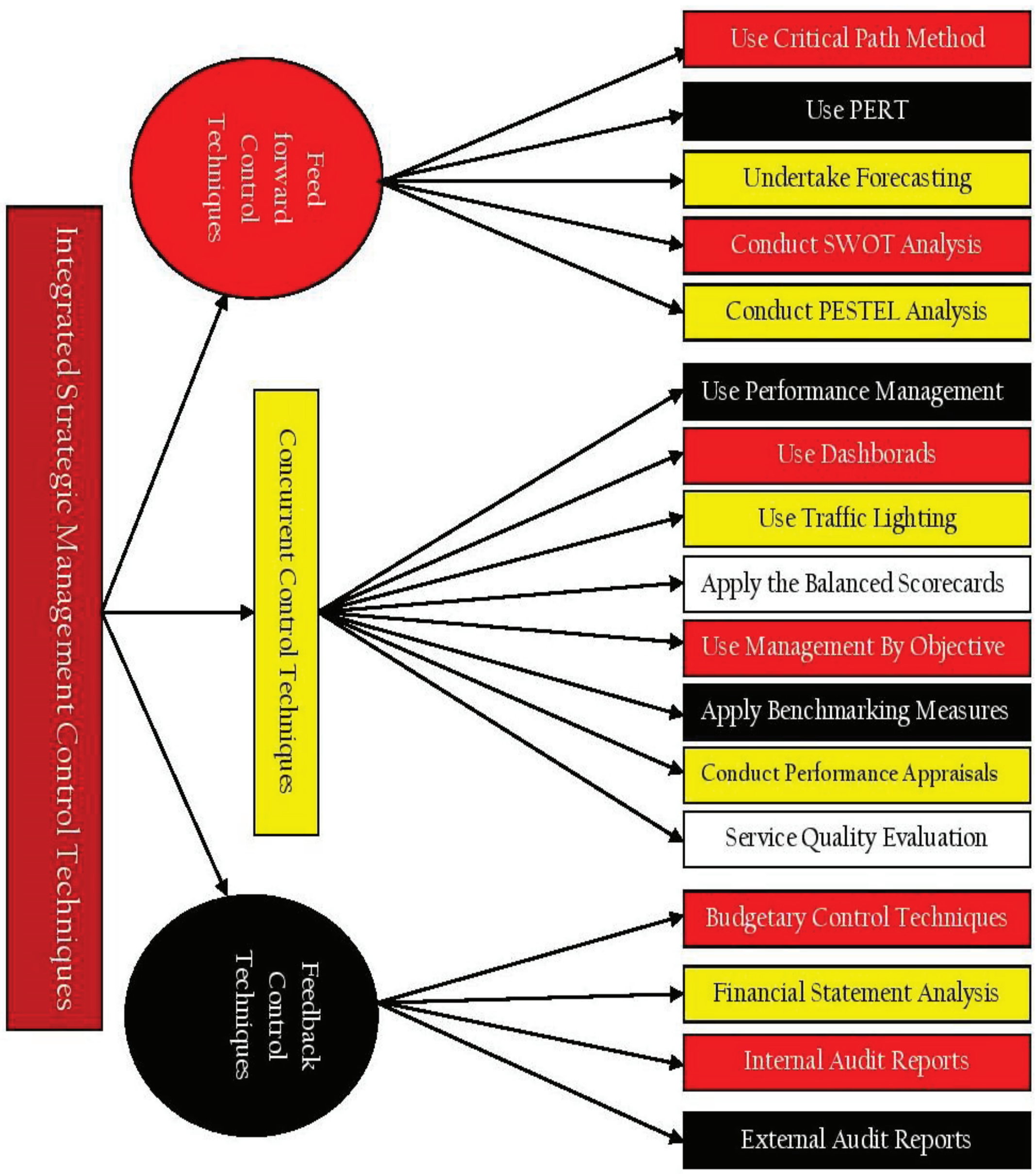
The identification of such likely future threats enables managers prepare contingent strategies through which changes which may interfere with the process of strategy implementation can be effectively outwitted. The application of the concurrent management control techniques titillates the ability of managers to keep the processes of strategy implementations on track, as the likely deviations are identified and corrected before they turn majorly significant and costly. The use of feedback management control techniques renders it possible for managers to evaluate the processes of strategy implementation after its completion in order to determine whether the strategy implementation has been successful and what the next course of action must entail. As it is pointed out in the next discussions, the overall findings of this research has got far reaching managerial implications for the managers in the South African public healthcare system.

9. Managerial Implications

While drawing from the findings of this research, the South African public healthcare system (SAPHS) will have to ensure that an appropriate strategic fit is created between the applications of feed-forward, concurrent and feedback management control techniques. Such a postulation is based on the fact that the findings reveal that there is skewed use of feedback public healthcare management control techniques, as feed-forward and concurrent public healthcare management control techniques are neglected. This means that the SAPHS is able to only evaluate activities after the completion of strategy or project implementation. It also signifies that healthcare managers are not able to detect likely future des-stabilising factors and take corrective actions as public health plans and strategies are implemented. This can be reversed by adopting the ***integrated framework of the strategic healthcare management control techniques in Figure 1.***

For ease of reference and application Figure 1 is replicated below. The use of this integrated framework implies that the South African public healthcare system will be able to effectively evaluate and monitor its activities at all angles (before implementation, during implementation and after implementation). Such a view is attributable to the fact that the application of feed-forward management control system would provide a set of public healthcare management control techniques which the SAPHS can use to assess previous and present data in order to predict future changes which may either distort or promote the successful implementation of its public healthcare plans and strategies. The application of concurrent public healthcare management control will provide the SAPHS with a set of techniques and measures which can be applied by managers and employees to monitor, evaluate, identify deviations and take immediate corrective actions as activities are executed.

Figure 1: ***Integrated framework of the strategic healthcare management control techniques***



On the other hand, the use of feedback public healthcare management control techniques shall provide public healthcare managers with a set of techniques for evaluating and measuring performance after tasks or activities have been completed. In order to accomplish this, Figure 1 indicates that the National Health Department must create a strategic fit that ensures that all these three types of management control techniques are used all the time. In terms of the feed forward management control techniques, Figure 1 illustrates that the South African public healthcare system must apply the techniques that include Critical Path Method (CPM), Programme Evaluation and Review Techniques(PERT), forecasting, SWOT Analysis, and PESTEL. It is further noted in Figure 1 that the application of the concurrent control techniques would require the South African public healthcare system to apply the techniques encompassing performance management, dashboards, traffic lighting, benchmarking, management-by-objectives, performance appraisals and service quality evaluation techniques. Finally, Figure 1 illustrates that the South African public healthcare system must apply feedback management control techniques that that include internal audit, external audit, budgets, auditor-general's reports, administrative measures, political measures and legal measures. Through the use of a combination of these techniques, the South African Public Health System can be able to identify all deviations at all times, and determine the corrective and improvement measures which can be undertaken to not only ensure the successful implementation of their healthcare strategies, but also improve the entire performance of the South African public healthcare system.

10. Suggestion for Further Research

This research resolved the conceptual limitations in management control theories and practical limitations in the South African public healthcare system that were identified to be latent in lack of an integrated framework of strategic healthcare management control techniques. However, its overall application will have to be followed by constant and careful monitoring and evaluation by management. This is attributable to the fact that its effective application is most likely to depend on the overall skillfulness of the employees, the availability of information systems for effective data capturing, storage and analysis, management commitment, and adequate financial resources for application of certain complex techniques such as TQM and benchmarking, and the implementation of corrective and improvement measures. On that basis, it is suggested that future research can examine the key success factors that influence the successful use of the a priori integrated multidimensional strategic healthcare management control techniques in Figure 1.

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