Accelerating Adoption of Clinical Innovations: Insights on Strategic Leadership Styles for Fostering Dynamic Capabilities by Public Referral Hospitals in Nairobi City County, Kenya

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ABSTRACT

It is unclear if there is a significant link between dynamic organisational capabilities and the adoption of clinical innovations. Specifically, Dynamic capabilities are the adaptive, innovative, and strategic resources organisations purposely utilise in complex and uncertain situations over a long time. The increasing need to understand how productive dynamic capabilities inform healthcare leaders to elevate decision quality in healthcare particularly to impact the implementation of clinical innovations remains underexplored in public referral hospitals. The research employed a nomothetic, descriptive, and cross-sectional survey design, gathering data from 189 consented healthcare leaders in four public referral hospitals in Nairobi City County. This approach offers advantages over idiographic methods by providing a broader understanding of general laws, patterns, or trends applicable to a large population. The data were collected through a digitized questionnaire. Descriptive and inferential results were presented numerically within text or tables and figures with organisational capabilities showing positive and statistical relationships with clinical innovation adoption (β = 0.2145; CI 95% [0.0512-0.3777], p = 0.01). In conclusion, organizational capabilities are shown as the most statistically significant and positive factors in the adoption of clinical innovations by public referral hospitals in Nairobi City County. This has implications for healthcare managers, theory, policy, and practice on where to focus and invest more and to aid them in choosing the most efficacious strategic leadership style. Managerial recommendation entails sustainably adopting clinical innovations through effective organizational capability development and maintenance. Additionally, policy changes can streamline innovation implementation, suggesting areas for further research.

Keywords: Clinical Innovation Adoption, Healthcare Leadership, Strategic Leader Behaviour, Strategic Leadership Style

I. INTRODUCTION

The importance of dynamic and meta-dynamic capacities in setting performance standards in profitable industries contrasts sharply with its limited application in public hospitals. Competent healthcare leaders are crucial in addressing the propensity to neglect human and capability aspects in the development and management of innovation adoption (Wong et al., 2023). This phenomenon has been acknowledged in organisations and has been shown to affect innovation (Singh et al., 2023). To achieve success, leaders prioritize leadership styles and policies to drive innovation adoption in hospitals (Philip et al., 2023; van de Riet et al., 2019). However, limitations persist regarding effective strategic leadership styles influencing the pace of clinical innovation adoption in healthcare (Bhidé, 2017). This circumscription is not well understood. Globally, evidence shows that approximately 30 to 50 per cent of patients receive treatment incongruent with prevailing scientific knowledge (Correa et al., 2020). This estimate underscores the significant gap, emphasizing the need for further capability research. This study endeavours to address the inconsistently erratic application of treatment and technologies' protocol from a leadership perspective. In Kenya, it is estimated that less than half of strategies developed are implemented, and that poor leadership skills are associated with many implementation failures, that is, not putting innovation to use or integrating it into a beneficial environment (Chege et al., 2015). The process of implementing medical innovations is often complex. Medical innovations that rely on artificial intelligence, for example, are not simple technologies. Because of their reliance on context to scale,

they are likely to clash with human expertise at various stages and may necessitate significant changes to existing decision processes (Mukherjee et al., 2022; Sun & Medaglia, 2019). The trend in this phenomenon is consistently supported by various factors and mechanisms of clinical innovation diffusion and adoption at the global, regional, and local levels (Balas & Chapman, 2018). As a result, the public healthcare sector is increasingly under pressure to use the traditional utilitarian and proritarian focus to accelerate, adopt, and integrate clinical innovations in order to improve patient care and geographic populations at large. The forces are strategic direction and behaviour that align capabilities and leadership styles in order to adopt innovations optimally and resources used to their full potential while also reducing costs.

The healthcare sector has been identified as one of the most promising application areas for AI (Yu et al., 2018). Artificial intelligence (AI) is playing a crucial role in healthcare by utilizing and analysing healthcare data to enhance patient care, minimize expenses and risks, and streamline administrative tasks in organizations (Gui et al., (2024). However, a balanced consideration of both the benefits and the dark side associated with using Artificial Intelligence (AI) are likely to serve hospitals well in organisational decisions between human experts and AI (Cao et al., 2021; Mukherjee et al., 2022). It is crucial to create facilitating conditions, address managers' concerns, and carefully weigh the advantages and disadvantages of using AI (Cao et al., 2021). Nonetheless, strategic renewal for meta-capabilities is necessary in public hospitals, encapsulating an organization's higher-order abilities to learn, adapt, and innovate, and are crucial sources in enabling public referral hospitals effectively. The process of implementing medical innovations is often complex. Medical innovations that rely on artificial intelligence, for example, are not simple technologies. This is because they rely on context to scale, they are likely to clash with human expertise at various stages and may necessitate significant changes to existing decision processes ((Mukherjee et al., 2022). The trend in this phenomenon is consistently supported by various factors and mechanisms of clinical innovation diffusion and adoption at the global, regional, and local levels (Balas & Chapman, 2018). The forces are strategic direction and behaviour that align capabilities and leadership styles so that innovations are adopted optimally and resources are used to their full potential while also reducing costs. The healthcare sector has been identified as one of the most promising application areas for AI (Yu et al., 2018). Artificial intelligence (AI) is playing a crucial role in healthcare by utilizing and analysing healthcare data to enhance patient care, minimize expenses and risks, and streamline administrative tasks in organizations (Dicuonzo et al., 2023). However, a balanced consideration of both the benefits and the dark side associated with using Artificial Intelligence (AI) are likely to serve hospitals well in organisational decisions between human experts and AI (Yu et al., 2018; Cao et al., 2021). It is crucial to create facilitating conditions, address managers' concerns, and carefully weigh the advantages and disadvantages of using AI (Cao et al., 2021). Nonetheless, strategic renewal for meta-capabilities is necessary in hospitals, encapsulating an organization's higher-order abilities to learn, adapt, and innovate, are paramount in enabling public hospitals effectively.

Medical technology refers to utilizing and evaluating clinical innovations in healthcare settings. Hospitals strategically position and shape perceptions utilizing medical technology as a major element in competition with healthcare providers (David et al., 2020). The definition of clinical innovations generally presents scepticism. This study endeavours to define clinical innovation, as detailed in the topic. In the case of Walsh et al. (2023), clinical innovation and scope of practice regulation were the central issues found to be violated. Clinical innovations seem to be those having verified (established and proven qualities). Yet, those in the investigation stage (the trial phase) or performed in violation of set regulation are regarded as unproven or unsafe (Lipworth et al., 2018). In this study, the predilection is for the term proven clinical innovation. This includes a wide range of innovations, such as novel cognizance about medicine, pharmaceuticals, advancements in technology, and so on. This reasoning highlights the important of including heuristics as less-than-optimal confirmation methods when considering standard testing. Overall, this is particularly common in other methodological tests and decision-making processes (Walsh et al., 2023).

Proven clinical innovations are likely to gain early acceptance and adoption seeing that they serve as puissant tools for the impacting health systems. Healthcare professionals value innovation for its coalescence of concepts, products, and procedures that lead to ameliorated outcomes (McKenna et al., 2018). As a result, the absence of a proven state of clinical or administrative innovation raises a principal weakness (Kittleson, 2024). This always underscores the need for precautions and accounting for benefits in healthcare systems. In this respect, this study had to investigate the link between dynamic capabilities and clinical innovation adoption by public referral hospitals in Nairobi City County.

II. MATERIAL & METHODS

The study population is depicted below in Table 1.

Table 1
Target Population

Hospital Type	Study participants category	No. of Officers
KNH Mbagathi	KNH senior and middle-level managers Mbagathi senior and middle-level managers Health facility head (KNH and Mbagathi)	42 31 2
Pumwani	Pumwani senior and middle-level managers Health facility head	33 1
Mama Lucy	Mama Lucy's senior and middle-level managers Health facility head	29 1
Total		139

Source: Data from the Ministry of Health (2019)

The research used a nomothetic, descriptive and cross-sectional survey research design and surveyed 189 target populations of healthcare leaders in four public referral hospitals in Nairobi City County because it has the advantage over idiographic approach for studying context and gaining a broad understanding of general laws, patterns, or trends, with applicability to large populations. The data were collected through a digitized questionnaire. Respondents rated items on a five-point Likert scale, with 5 indicating 'strongly agree', 4 indicating 'agree', 3 indicating 'undecided', 2 indicating 'disagree' and 1 indicating 'strongly disagree'. This scale, commonly used in social research, is easy to complete and approximates an interval scale Kothari & Garg, 2019; Saunders et al., 2020). This improves the accuracy of the conclusions they reach, and due to anonymity, respondents feel more comfortable sharing information, which enhances the accuracy of the data obtained (Saunders et al., 2020). Managers and departmental heads were chosen as the most suitable subject group to answer questions regarding the structure, strategy, and long-term adoption of medical innovations. Their oversight of daily operations allows them to better understand the institution's position (van de Riet et al., 2019). Similarly, Zhou et al. (2023) and Spain and Woodruff (2023), found that senior and middle managers play a crucial role in cultivating strategic direction and facilitating organisational change. Elsewhere, Sekaran and Bougie (2020) presented a similar rationale for their work.

The samplings conducted included stratified random sampling of four out of a total seven public referral hospitals as units of analysis to include 1 large and 3 medium hospitals as proportional strata. Purposive sampling procedures was performed for healthcare leaders as units of inquiry in the study. Both stratification and random sampling allowed the study to constitute a final sample (Kothari & Garg, 2019; Lohr, 2021; Nguyen et al., 2021). The primary data were initially used to explain exploratory factor analysis and then multivariate linear regression performed. The collected data was then analysed, aided by the statistical software STATA version 15.1.

III. RESULTS & DISCUSSIONS

The study analysis provided both descriptive and inferential values. The findings showed 100% response rate. The pretested questionnaire tested valid and reliable within Cronbach's (α) values 0.88. This is likely because a larger number of participants were interested in the topic, or anonymity increased their willingness to participate. Additionally, the short time to complete the digitized questionnaire may have contributed. The data analysis was accomplished using the aid of collected and analysed aided by STATA software version 15.1. Pearson' moment-correlation coefficient demonstrated positive correlation between the four components of strategic leadership style mentioned in the research objectives and the adoption of clinical innovations by public referral hospitals in Nairobi City County. Descriptive and inferential results were presented numerically in text, tables, and figures. Organizational capabilities exhibited positive and statistically significant relationships with clinical innovation adoption. Descriptive data on response rate is depicted in table 2 below.

Table 2

Response Rate

Strata of public referral hospitals N=3	No. of Sampled Hospitals n=4	Total No. of Digitalized Questionnaires Administered n =189	Total No. of Valid Questionnaires Returned n=189	Total No. of Hospitals with Valid Response n=4	Valid Response Rate n=189
Kenyatta National Hospital			48		
Mbagathi Hospital			**57**		
Pumwani Hospital			45		
Mama Lucy Hospital			39		
Total					189 (100%)

4.1 Descriptive Results of the Referral Hospital Profiles

Table 3 below denote the results of respondents' hospital characterisation in terms of hospital type.

Table 3

Hospital Type

Variable	**Frequency**	**Percent**
Overall (%)	189	100
Hospital Type, n= 4		
Kenyatta National Hospital	48	25.4
Mbagathi Hospital	57	30.2
Pumwani Hospital	45	23.8
Mama Lucy Hospital	39	20.6

This study employed descriptive statistical analysis to outline basic statistics and the distribution of public referral hospitals. These statistics, comprising percentages and frequencies, contribute to forming the hospital profile of the participants. Out of 189 valid survey responses, the large size of respondents 57 (30.2%) came from Mbagathi Hospital, followed by 48 (25.4%) from Kenyatta National Hospital, 45 (23.8%) from Pumwani Hospital, and the remaining 39 (20.6%) from Mama Lucy Hospital. The results on demographic data identified that those healthcare leaders with 15-20 years of tenure were likely to have a higher propensity for adoption of clinical innovations. Table 4 below denote the results of mean and standard deviation for each study variable.

Table 4

Descriptive Findings of Study Variables

Variable	**N**	**Mean**	**Std. Deviation**
Organisational Capabilities	189	3.74	.40
Cultivating Innovation-oriented Attributes	189	3.96	.40
Managers' Behavioural Predilections	189	3.32	.67
Promoting Innovation in Organisation	189	3.77	.56
Clinical innovation adoption	189	3.69	0.50

The study's sample mean score (xi) of the variable serves as a representative parameter for the population mean. It is determined by summing up the observations and dividing by their total number ($\bar{x} = (\Sigma xi) \div n$). Meanwhile, the standard deviation provides a measure of variability from the mean in a normal probability

distribution curve. It is worth noting that the area under the curve equals 1. An important aspect to consider is that the left and right tails of the distribution theoretically extend to infinity, emphasizing the potential range of values within the dataset. The organizational capabilities, with a mean score of 3.74 and a standard deviation of 0.40, reflect a relatively tight and positively skewed distribution. Positive skewness implicatively insinuates a tail on the right side of the distribution, suggesting a few scores higher than the mean. In summary, a mean score of 3.74 with a standard deviation of 0.40 designates a tightly clustered distribution with a propensity for higher scores, possibly influenced by a few exceptional cases. Table 5 below depict results of Pearson correlation between predictor and response variable.

Table 5
Pearson Correlation between predictor variables and response variable

Variable	Pearson correlation coefficient(p-value) 2-tailed
Organisational capabilities	r = 0.4967 p <0.01
Cultivating innovation-oriented attributes	r= 0.3018p<0.01
Managers' Behavioural Predilections	r= 0.1114p=0.009
Promoting innovation in Organisation	r = 0.3866 p<0.0010

Organizational capabilities demonstrated a significant positive relationship with adoption support ($r = 0.5091$; $p < 0.01$). The correlation coefficient ($r = 0.5091$) indicates a moderate positive linear relationship between the variables. This suggests that as organizational capabilities increase, adoption support tends to increase as well. The p-value of less than 0.01 indicates that this relationship is statistically significant, meaning it is unlikely to be due to chance. Figure 1 below denote the graphical results of normally distributed curve.

4.2 Results of assessment for Assumptions of Multiple Linear Regression Analysis

4.2.1 Normality Test

Skewness and kurtosis scores are the first indicators that denote normally distributed assessment of assumptions prior to multiple linear regression analysis. The null hypothesis in Shapiro-Wilk tests usually asserts that the data is normally distributed. As a result, the study's assertion was that the dataset from which the samples were taken most likely had a normal distribution as the null hypothesis. The test determined if the sample data contains sufficient evidence to reject the null hypothesis and supports the alternative theory that the data is not normally distributed. The findings of skewness and kurtosis did not deviate significantly which is negligible. The Shapiro-Wilk test is considered the most suitable technique for small data sets (Hernandez, 2021; Knief & Forstmeier, 2021).

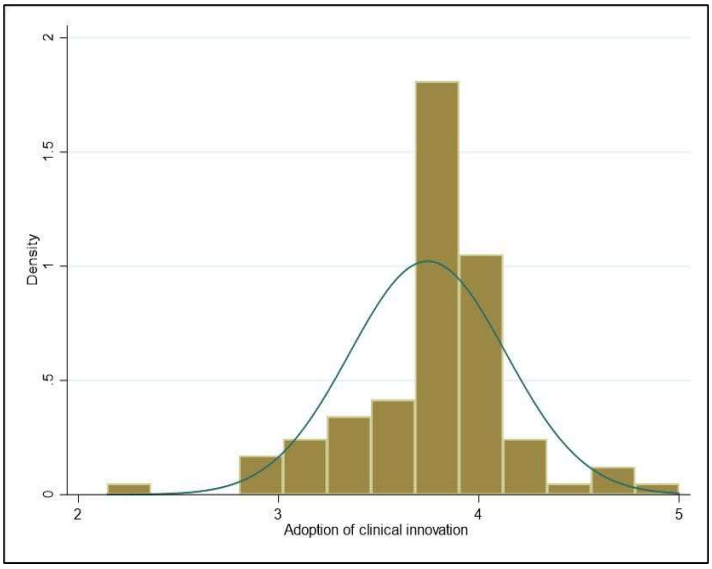

Figure 1
Histogram of the mean scores for adoption of clinical innovations

4.3.2 Linearity Results

Figure 2 below depict a scatter plot showing the Y (response variable) as linear function of observations in X (predictor).

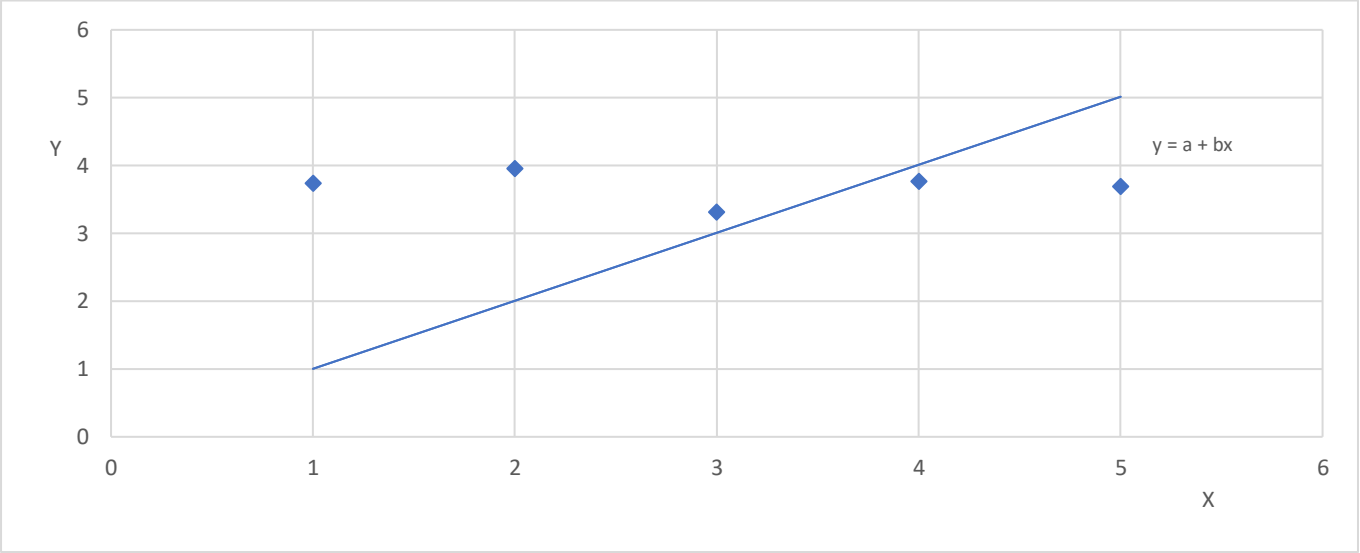

Figure 2
Scatter diagram showing the relationships between Y and X

4.4 Hypothesis Testing Results

Based on determining a specific objective and the results of testing a priori hypothesis, which stated both in a null and an alternative hypothesis on there being or no relationship between organisational capabilities and clinical innovation adoption, it revealed (β = 0.2145; CI 95% [0.0512-0.3777], p = 0.01), which failed to support the null hypothesis ($H_0$1). Instead, the study failed to reject the alternative (Hα1) at significance level ($\alpha \leq 0.05$). Further, this study's findings align theoretically with Vagnani and Volpe's (2017) research, adding coherence to the reviewed literature. Findings of Computed coefficient of determination (R^2) is depicted in Table 6 below.

Table 6
Descriptive results using predictor variable coefficients of determination (R^2)

Coefficient of each Predictor variable		Mean Outcome =1.397	Explained sum of squares (ESS) = 0.0038	Total sum of squares (TSS) = 0.0848
i	0.2145			
ii.	0.0857			
iii	-0.0783			
iii.	0.2559			

Predicted Outcome (β_0 = 1.335) ≈ 1.459
Mean Outcome ≈ 1.397

While literature is cautious about overly interpretation of R^2, the study deployed R^2 = ESS/TSS formular for predictors and outcome variable. So, the coefficient of determination is approximately 0.0449. In summary, a value of 0.45 suggests that the model provides a moderate fit to the data, meaning that the predictor variables explain a moderate amount of the variability observed in the dependent variable.

The results of multiple regression at 95% confidence interval are shown below in Table 7.

Table 7

Multiple Regression on the Relationship between Strategic Leadership Style and Clinical Innovations Adoption by Public Referral Hospital in Nairobi City County

Variable	Coefficient	95% confidence interval (CI)		p-value	VIF	Tolerance
		Lower limit	Upper limit			
Constant (βo)	1.335					-
Organisation Capabilities	0.2145	.0512	.3777	0.010**	1.7955	
Cultivating Innovation-Oriented Attributes	0.0857	-0.0444	.2158	0.195	1.5901	0.6289
Managers' Behavioural Predilections	-0.0783	-0.1547	-0.0018	0.045**	1.5343	.6518
Promoting Innovation in Organisation	0.2559	.1540	.3578	<0.001**	1.7281	.5787

**Indicates a significant regression coefficient at p<0.05

Predictors : (Constant), Organisational Capabilities, Cultivating Innovation-Oriented Attributes, Managers' Behavioural Predilections, Promoting Innovation in Organisation

Dependent variable: Adoption of Clinical Innovations

Al Wali et al. (2023), Bojesson et al. (2021), and Coffin and Tang (2023) emphasize the importance of hospitals, like all organizations, integrating research-based findings into their operations and innovation efforts for success. Similarly, a survey conducted by Loureiro et al. (2023) involving 245 professionals in leadership and management roles within healthcare organizations underscores the significance of understanding dynamic capabilities and their influence on organizational performance. Effective strategic leadership practices can bolster hospital performance, competitiveness, and the quality of care, facilitating the development and implementation of strategies aimed at fostering intention and behaviour conducive to adopting clinical innovations.

V. CONCLUSIONS & RECOMMENDATIONS

5.1 Conclusions

In conclusion, the study highlights the importance of understanding organizational capabilities as fundamental for acquiring necessary resources and competencies crucial for managing clinical innovations effectively. This understanding is vital for investing wisely during implementation and promoting a streamlined process. By prioritizing areas and strategically allocating resources, public hospitals can enhance their capabilities, leading to faster adoption and integration of clinical innovations. Essentially, a solid grasp of organizational capabilities acts as a catalyst for creating favourable conditions for successful innovation management in healthcare.

5.2 Managerial Recommendations

Public referral hospitals in Nairobi City County must adapt to both gradual and rapid changes in the external environment. This includes addressing BANI (Brittle, Anxious, Non-linear, and Incomprehensible) challenges, crucial for maintaining competitiveness. Strategic management approaches must evolve, facilitated by effective leadership, to differentiate hospitals from competitors. Sustainable adoption of clinical innovations hinges on developing and maintaining effective organizational capabilities. Statistical analysis underscores the pivotal role of organizational capabilities in innovation adoption. Hospitals must constantly diffuse, communicate, and embrace technological innovation to promote innovation-oriented attributes among potential adopters. Managers should integrate employee perceptions and emotions, fostering positive attitudes towards innovation adoption. Experience of 10-15 years is statistically significant in adoption compared to over 20 years, emphasizing the importance of resource allocation and leadership development. Continuously promoting innovation within organizational activities is crucial for adoption. Training and exposure to innovation are key to improving resource allocation, administrative, product, and process innovation.

5.3 Policy Recommendations

To succeed, public referral hospitals must recognize and navigate gradual, chaotic, and rapid changes in their external environment. Organizational capability changes bring both opportunities and challenges, shedding light on pertinent regulatory affairs. As frontline innovators, hospitals and employees must insulate themselves from external influences to adopt clinical innovations efficiently. Hospitals facing competition or external pressure must think

innovatively and act strategically to thrive. Those that embrace strategic attitudes, behaviours, and characteristics through effective leadership are better equipped to develop competencies and succeed in a rapidly changing environment.

5.4 Areas for Further Research

Based on the study's findings and conclusions, several recommendations for future research emerge:

Firstly, conduct a longitudinal study (panel study) to track strategic leadership styles in clinical innovation adoption over time. Secondly, incorporating qualitative approaches can enrich the data and provide deeper insights into the process. Thirdly, explore the development of human capital and competencies, organizational capabilities, and promotion of innovation within organizations as strategic leadership practices in future research endeavours. Future research has the potential to delve into the influence of cultural, ethical, and neuro-leadership factors on strategic leadership styles within healthcare systems. Exploring these factors could contribute to improved decision-making and innovation, especially in the integration of AI. This shift in focus would entail moving away from the traditional emphasis solely on strategic leadership styles, as demonstrated in this investigation. Instead, it aims to foster a more comprehensive understanding of leadership dynamics within healthcare contexts.

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