Scholars Journal of Economics, Business and Management OPEN ACCESS
Abbreviated Key Title: Sch J Econ Bus Manag
ISSN 2348-8875 (Print) | ISSN 2348-5302 (Online)
Journal homepage: https://saspublishers.com

Assessment of Instrument Viability for Researching Intrapreneurship Practices, Board Structure, and Performance of Sub-County Hospitals in Kenya

Isaac Kipchirchir Kamar[1*], James Maengwe[2], Christopher Ngacho[3], Caleb Akuku[2]

[1]Doctoral Candidate, Department of Business Administration, School of Business and Economics, Kisii University
[2]Department of Business Administration, School of Business and Economics, Kisii University
[3]Department of Management Sciences, School of Business and Economics, Kisii University

DOI: https://doi.org/10.36347/sjebm.2026.v13i03.001 | **Received:** 04.01.2026 | **Accepted:** 13.02.2026 | **Published:** 05.03.2026

***Corresponding author:** Isaac Kipchirchir Kamar
Doctoral Candidate, Department of Business Administration, School of Business and Economics, Kisii University

Abstract **Original Research Article**

The healthcare sector in Kenya faces numerous challenges that impact its overall performance and quality of care. To address these challenges, healthcare organizations increasingly adopt intrapreneurship practices. This pilot study evaluated the viability of the research instrument designed for a main investigation on the effect of intrapreneurship practices on health sector performance in Kenya as moderated by the board structure in Sub-County hospitals at Elgeyo Marakwet County. The pilot assessed the effectiveness of the proposed data collection method, the reliability and validity of respective scales in the instrument, and the feasibility of using the Partial Least Squares - Structured Equation Modeling (PLS-SEM) in data analysis. Piloting was conducted in Uasin Gishu County's Sub-County hospitals, similar study context expected in the main study. Both stratified and simple random sampling techniques were used to sample the pilot study participants, comprising healthcare employees. Data were collected using a questionnaire. Data screening revealed potential for missing values in the real data due to close spacing of items in the respective scales. To remedy this, spacing would be made uniform. Potential for univariate outliers in the cross-functional collaboration construct was detected. Therefore, more questionnaires would be issued to replace cases that may be removed. Items measuring each construct in the pilot were dependable and achieved the minimum threshold of Cronbach Alpha ($\alpha \geq 0.7$), implying they would yield consistent results in the large-scale study. On validity, all constructs were the middling Kaiser Classification category except for healthcare performance, which was in meritorious category. Two items measuring cross-functional collaboration and one for healthcare performance were redundant and would be dropped from the questionnaire for the extensive research study. The board structure construct factors explained only 60.4% of the variance in the construct. Three additional indicators were subsequently introduced to increase total variance explained to 81.96%. Data diagnostics confirmed that the PLS-SEM framework was suitable. The outer loadings indicated that the formative indicators appropriately defined their respective constructs. Therefore, the pilot study confirmed that the instrument is suitable for the main study.

Keywords: Intrapreneurship Practices, Board Structure, Performance, Sub-County Hospitals, Piloting, Research Instruments.

INTRODUCTION

Guaranteed access to quality healthcare by the citizens is the responsibility of the government. Quite often, novel health interventions are implemented to meet the expected health standards [1]. In most developing nations, Kenya included, the health sector is constrained by limited resources [2]. To circumvent these healthcare resource shortages, hospitals have been forced to consider acceptable innovative solutions. In Kenya for instance, the concept of cost sharing was born out of such an initiative. In order to optimize the accrued benefits of cost sharing, healthcare institutions are fast turning towards innovation to optimize their potential in service delivery.

Entrepreneurship has therefore been identified as a central driver of organizational performance, particularly by leveraging on practices such as innovation, risk-taking and pro-activeness. Unfortunately, there is limited empirical evidence regarding the potential influence of these practices on public health sector performance in Kenya, and

particularly in Sub-County hospitals in Elgeyo Marakwet County (EMC). Like many other counties in Kenya, EMC faces challenges such as limited financing and increasing healthcare demands that pose threats to healthcare performance. One of the focal areas in healthcare delivery at the counties, are the Sub-County hospitals which are semi autonomously operated under the stewardship of a recruited board of management. Understanding the role that the board can play in the nexus between intrapreneurship and performance of Sub-County hospitals through an extensive research study holds the solution to resource challenges that Sub-County hospitals in EMC face. This pilot study aims to test whether the data collection tool accurately and consistently measures the underlying constructs and, the feasibility of the proposed data analysis method to be used in a comprehensive study on intrapreneurship practices, board structure and healthcare performance in EMC.

The purpose of this study was to pilot the research methodology and study questionnaire on a small sample of participants drawn from a similar study context as the main study. In essence, this study sought to examine the viability of using the developed questionnaire to conduct an extensive research study in EMC Sub-County hospitals in establishing how intrapreneurship practices effect the performance of the health sector, and the moderating role of the board structure. A pilot study is recognized as a comprehensive preliminary study carried out on a small sample with similar characteristics to the study population to examine the effectiveness and appropriateness of the research methods and procedures as well as suitability and feasibility of the data collection instruments before a full-scale study. According to Romeike *et al.,* a pilot study scrutinizes logistical challenges, seeking to clarify and refine the tools and design in order to optimize the research project in a large-scale study [3]. The focus of a pilot study is therefore to assess the instrument in terms of clarity, reliability, and the potential to collect data that is meaningful [4].

Objectives of the Pilot Study

This pilot study focused on the following three objectives:

i. To assess the consistency of data collection instrument to be used in the research
ii. To test the validity of respective scales in the research instrument
iii. To assess the feasibility of using PLS-SEM approach to analyze data in the research on:
    a. The effect of innovation culture on performance of Sub-County hospitals
    b. The effect of risk management on performance of Sub-County hospitals
    c. The effect of pro-activeness on performance of Sub-County hospitals
    d. The effect of cross-functional collaboration on performance of Sub-County hospitals
    e. The moderating effect of board structure on the relationship between intrapreneurship practices (innovation culture, risk management, pro-activeness, and cross-functional collaboration) and performance of Sub-County hospitals

MATERIALS AND METHODS

This pilot study assessed the viability and suitability of the developed questionnaire for a large-scale study to be conducted in Sub-County hospitals within Elgeyo-Marakwet County (EMC), Kenya. The study investigated how intrapreneurship practices influence healthcare performance and the moderating role of board structure. The quantitative pilot instrument was adapted from existing scholarly work on intrapreneurship, healthcare performance indicators, and board governance. Intrapreneurship practices (innovative culture, risk management, employee proactiveness, and cross-functional collaboration), healthcare performance (patient outcomes, quality of care, and financial sustainability), and board structure were operationalized following an extensive review of literature [5,6,7,8,9,10,11,12].

The adapted items underwent expert review by healthcare professionals and academic supervisors to ensure content adequacy, clarity, and contextual relevance. A total of 63 items were retained to measure the core constructs, capturing intrapreneurial practices that enhance financial sustainability and patient outcomes, as well as board governance mechanisms that support innovation and overall facility performance. The instrument utilized a 5-point Likert scale tailored to each construct; very weak to very strong (intrapreneurship practices), poor to outstanding (healthcare performance), and strongly disagree to strongly agree (board structure).

In line with Treece's recommendation, pilot respondents should constitute 10% of the main study sample, this pilot involved 24 participants [13]. These were drawn proportionately from amongst staff serving in two Sub-County hospitals in Uasin Gishu County. The pilot enabled identification of ambiguities, assessment of questionnaire flow, and validation of suitability for the large-scale study of a sample of 236 participants determined using Cochran's sample size formula for finite populations [14]. Stratified random sampling ensured proportional representation of diverse employee cadres (Table 1), to enhance representativeness and accuracy in instrument evaluation.

Table 1: Stratified Sampling

Cadre	Population (N)	Sample Size (Proportionate)	Pilot Respondents
Medical Practitioners	113	44	4
Nursing	178	69	7
Pharmacy	25	10	1
Administrative Staff	144	56	5
Public Health	35	13	1
Medical Support Staff	48	18	2
Diagnostic Services	43	16	2
Nutritional Services	12	5	1
Rehabilitation Services	12	5	1
Total	**610**	**236**	**24**

Table 1 presents the distribution of the total study population (610), the proportionate sample size (236), and the pilot respondents (24) across the various healthcare cadres. Nursing staff formed the largest proportion in the pilot (7), followed by administrative staff (5), medical practitioners (4), while medical support and diagnostic services each had 2 respondents. Smaller cadres, nutritional services, rehabilitation services, and public health each contributed 1 respondent. The participation of 24 respondents aligns with Treece's [13] guidance of using 10% of the intended sample during a pilot phase to adequately assess the feasibility, identifying clarity issues, and reveal potential methodological challenges.

Once the questionnaires were returned, they were processed and data analyzed using Partial Least Squares Structural Equation Modelling (PLS-SEM) which has been credited for offering scholars suitable means to simultaneously estimate and model complex relationships [15]. The four direct relationships pitting each intrapreneurial practice construct and healthcare performance, together with the moderating influence of board structure conceptualized in this pilot study. PLS-SEM models were relevant in predicting the causal effect relationship between intrapreneurship practices on healthcare performance and the moderating effect of board structure in this study.

This study considered the two categories of analytical models (Figure 1 & Figure 2). The first category focused on the outer models of the five main constructs under study (excluding the moderator). The second category examined the inner model relating intrapreneurship practices with healthcare performance, while the third category introduced the moderating effect due to board structure.

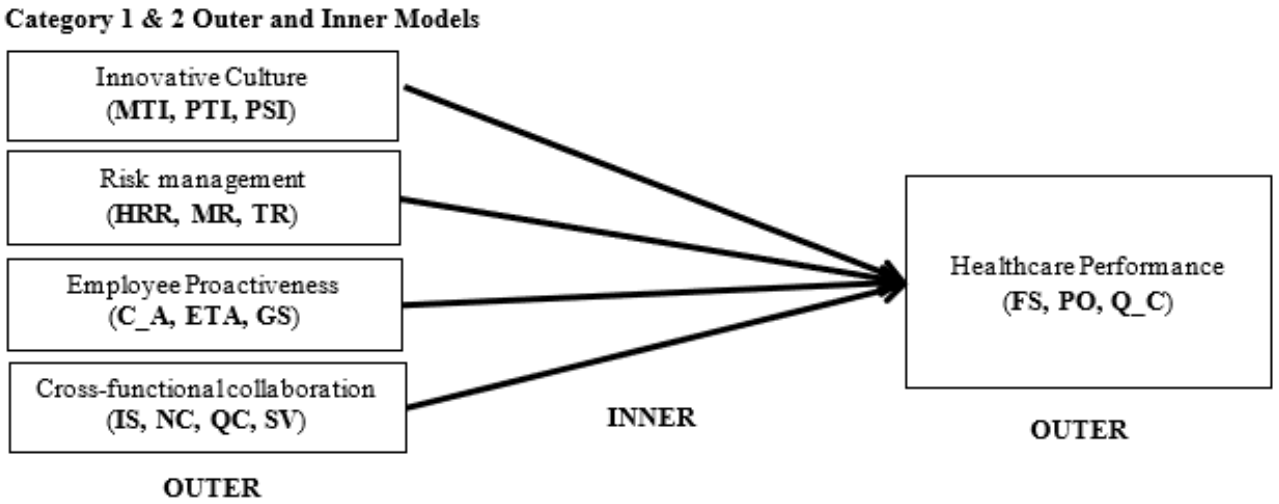

Figure 1: Outer and inner models for direct effect

Category 3 Moderating

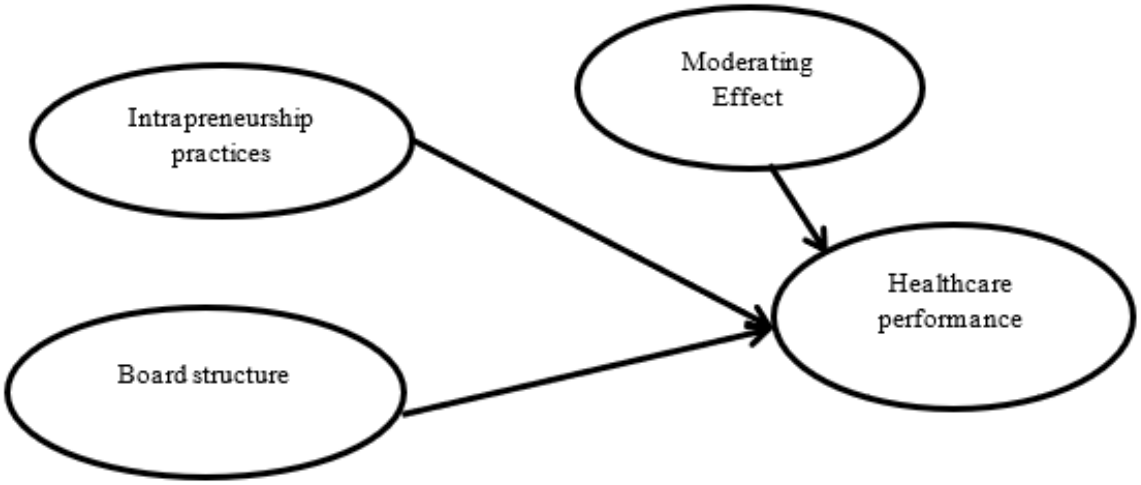

Figure 2: Moderating model

RESULTS

Sample Description

The group of interest in this study were the health department employees based in Uasin Gishu Sub-County hospitals, deemed to be similar in context and exposure as the main study. Expert review by supervisors and health specialists ascertained instrument's scope of coverage and content and, recommended instrument piloting at Burnt Forest Sub-County Hospital in the rural set-up and Huruma Sub-County Hospital in the urban area of Uasin Gishu County, replicating the situation in the main study.

A proportionate target for each stratum was determined using the cadre-specific numbers from each facility, resulting in a total of 24 potential respondents. Simple random sampling was then applied to select the individuals who would receive the questionnaire. Although the pilot sample was small, it was sufficient to evaluate feasibility and to identify any potential issues in relation to the study objectives. The questionnaire, structured on a 5-point Likert scale, was administered by a research assistant to all selected respondents between 10th and 13th March 2025. Table 2 presents the description of the participants where 66.7% of the employees were female, majority (37.5%) were in the age bracket of 18 to 25 years, with only 8.4% falling between 46 to 55 years. Similarly, most of them (41.7%) have worked in the health sector for only one year or less; 33.3% have been in the sector for between 1 and 5 years, and only 8.3% of the employees indicated to have been in the sector for over 15 years.

Table 2: Sample Description

		Frequency (n)	Percentage (%)
Respondents gender	Male	8	33.3%
	Female	16	66.7%
	Total	**24**	**100.0%**
Respondents age	18-25	9	37.5%
	26-35	8	33.3%
	36-45	5	20.8%
	46-55	2	8.4%
	Total	**24**	**100.0%**
Years worked in health sector	less than 1	10	41.7%
	1-5	8	33.3%
	6-15	4	16.7%
	over 15	2	8.3%
	Total	**24**	**100.0%**

Feasibility

The pilot study confirmed the feasibility, suitability, and methodological coherence of using the adapted questionnaire to examine the influence of intrapreneurship practices on healthcare performance and the moderating role of board structure in Sub-County hospitals within Elgeyo-Marakwet County (EMC). The instrument developed from established scholarly work on intrapreneurship, healthcare performance, and board was subjected to expert review to ensure clarity, contextual relevance, and appropriateness for frontline healthcare settings. The resulting 63 items operationalized the key constructs using tailored five-point rating scales: very weak to very strong

(intrapreneurship practices), poor to outstanding (healthcare performance), and strongly disagree to strongly agree (board structure). These scales demonstrated adequate sensitivity for capturing the nuances of innovation-related behaviors and governance dynamics in health facilities.

Consistent with Treece's [13] recommendation that pilot participants constitute approximately 10% of the main study sample, 24 respondents were selected to reflect the cadre proportions anticipated in the large-scale study (n = 236), determined using Cochran's [14] formula for finite populations. Stratified random sampling ensured representation from all key health workforce categories, thereby maximizing the instrument's ability to detect issues clearly across diverse professionals. The distribution of respondents mirrored the structure of the broader health workforce, with nursing, administrative staff, and medical practitioners comprising the largest strata. This proportional composition enhanced the robustness of the instrument evaluation.

Administration of the questionnaire proceeded smoothly, with respondents taking approximately 5–8 minutes to complete the instrument, demonstrating its clarity and manageable cognitive load. No challenges emerged in recruitment, comprehension, or response flow, and all selected health facilities were easily accessible. Minor refinements were nonetheless identified mainly the need for uniform spacing of items and removal of redundancies to enhance efficiency in the main study. Data returned from the pilot were analyzed using Partial Least Squares Structural Equation Modelling (PLS-SEM), selected for its capacity to estimate complex causal relationships simultaneously and its suitability for prediction-oriented research [15]. The analytical framework encompassed: outer measurement models assessing indicator reliability and construct validity for intrapreneurship practices, healthcare performance, and board structure; inner structural models assessing the direct effects of intrapreneurship practices on healthcare performance; and a moderated structural model evaluating the influence of board structure on these relationships (Figure 1 & Figure 2).

Psychometric assessment showed strong internal consistency, with Cronbach's alpha values ranging between 0.920 and 0.945, and acceptable construct adequacy as indicated by KMO values of 0.726–0.847. Three items: two under cross-functional collaboration (inclusivity in decision-making and sharing of ongoing project information) and; one under healthcare performance (risk management and challenge mitigation) exhibited redundancy and will be removed in the main study to strengthen construct precision. All constructs demonstrated coherent factor structures except for board structure, which indicated insufficient indicator loadings and high unexplained variance. To improve its explanatory capability, additional board-related indicators will be incorporated in the main study.

Overall, the pilot established that the instrument is feasible to administer, psychometrically sound, contextually relevant, and analytically compatible with PLS-SEM modelling requirements. The refinements emanating from this phase enhance methodological rigor and position the instrument for effective deployment in the forthcoming large-scale study involving the 236 respondents across EMC Sub-County hospitals.

Data Quality

Data quality assurance procedures were integrated throughout the pilot to confirm the suitability of the adapted instrument for the main study. Following expert review by healthcare professionals and academic supervisors, the questionnaire was refined to ensure clarity, construct adequacy, and contextual appropriateness. A trained research assistant administered the instrument uniformly across Burnt Forest and Huruma Sub-County Hospitals, following standardized instructions and ethical protocols. The demographic diversity of respondents captured across cadres, age groups, and years of service enhanced representativeness and supported the robustness of the pilot data. Consistent procedures in administration of the instrument in the facilities ensured comparability across the two facilities, and respondents demonstrated clear comprehension of the items, reflected in coherent descriptive patterns across constructs.

All questionnaires distributed were retrieved and screened for completeness and internal consistency. Data entry employed double-entry verification to minimize transcription errors. Missing value analysis revealed that no cases had more than 5% missing responses. The few missing values observed were minimal and randomly distributed, and therefore did not pose any threat to the validity or reliability of subsequent analyses. Univariate outlier detection revealed one erroneous value within the cross-functional collaboration items, which was documented and removed. No multivariate outliers were detected, indicating stable response patterns and supporting the internal coherence of the instrument.

With completeness, consistency, and reliability confirmed, descriptive analyses were conducted to assess the preliminary distribution of the core constructs: innovation culture, risk management, employee proactiveness, cross-functional collaboration, healthcare performance, and board structure. The results affirmed the instrument's capacity to capture construct variability and supported its readiness for deployment in the study.

Descriptive Statistics for Intrapreneurship Practices

Innovative Culture

Innovative culture was measured using nine items adapted from Filardi *et al.,*who focused on

innovation culture in the Brazilian healthcare, emphasizing among others; open communication, organizational support, capacity building for innovation, and taking calculated risks [16]. The scale was therefore modified to suit the needs of EMC healthcare. Descriptive results revealed that most employees rated innovative culture as being moderately strong (MS), strong (S) or very strong (VS). Therefore, the innovative scale proved to be suitable for a large-scale study to be conducted in EMC.

Risk Management Practices

Risk management was measured using ten items developed after a thorough review of existing studies. All the items were grounded in the studies by Rosenkranz who used the hospital governance and pharmaceutical policy context to deliberate on monitoring frameworks and fundamental risk discernment [17], and Fischer who provided a hospital-level risk assessment and mitigation framework [18]. Descriptive results also indicated a strong adherence to risk management practices in the Sub-County hospitals participating in the pilot study. A high proportion of respondents tended to rate the items reflecting the risk management practices very strongly, clearly indicating the potential of the risk management scale to be used in a large-scale study.

Employee Proactiveness

The employee proactiveness scale comprised of nine items developed from the works of Shawky *et al.,*who used intensive care nurses to probe the nexus between managerial innovation and productivity alongside locus of control [19], and Abdrabou and Ghonem who adapted a proactivity scale [20]. Descriptive statistics demonstrated that there was strong to very strong presence of proactiveness as an intrapreneurial practice in the Sub-County hospitals surveyed. The questionnaire was able to elicit positive responses from the pilot sample showing its suitability for the large-scale study.

Cross-Functional Collaboration

Ten items were initially identified from studies by D'Souza *et al.,*[21] and Yin *et al.,*[22] to measure cross-functional collaboration practices. However, after validity check using PCA, two items were deemed redundant leaving eight items. As in the case of the previous intrapreneurial practices, cross-functional collaboration had a strong presence in the Sub-County hospitals used in the pilot study.

Descriptive Statistics for Healthcare Performance

The healthcare performance scale was developed to contain ten items consistent with studies by Albi and Suresh [23] and Yin *et al.,*[22]. After running PCA, the item on "Effectively managing risks and addressing challenges in the healthcare sector" was found to be redundant leaving nine items for consideration. Descriptive analysis results revealed that healthcare performance in the Sub-County hospitals surveyed was deemed very satisfactory. High proportions of satisfaction ratings were in the very satisfactory category followed with the satisfactory category. The healthcare performance scale was found to be suitable for a large-scale study.

Descriptive Statistics for Board Structure

Board structure was comprehensively measured using thirteen practices scoped from the studies by Rastoka *et al.,*[24], and Ortiz-Hunt and Lerner [25]. The descriptive analysis results targeting employee ratings revealed that the Sub-County hospitals surveyed had concise board structures. This was demonstrated by the large proportions of respondents showing agreements and strong agreements. Therefore, the board structure scale was ideal for a large-scale study.

Data Diagnostic Test

Equally, rigorous procedures were run to test if multivariate assumptions were satisfied as an important consideration in developing the model using Partial Least square Structured Equation Modelling (PLS-SEM) and interpreting the results. The PLS-SEM approach was selected for this study because of several reasons. Firstly, PLS-SEM is a composite-based approach that relaxes the strong assumptions of multivariate analysis [15]. PLS-SEM also works with small sample sizes, guaranteeing that a small study with a sample of 24 would provide robust results. Although PLS-SEM is not sensitive to multivariate assumptions, scholars have argued that when applying PLS-SEM it would be prudent to perform various robustness checks, including non-normality, unobserved heterogeneity and non-linearity that might threaten the validity of the results [15,16]. In retrospect, these robustness checks were conducted to get a picture on the likelihood of achieving valid results in the main study.

Testing for non-normality

Normality of the pilot data was assessed using the Kolmogorov–Smirnov test as a robustness checks rather than a strict assumption, given that Partial Least Squares Structural Equation Modelling (PLS-SEM) is distribution-free. All constructs recorded p-values above 0.05, indicating no statistically significant departure from normality. Consequently, the distributional characteristics of the data did not pose any limitations to the proposed PLS-SEM analysis.

Table 3: Tests for Normality

	Kolmogorov-Smirnov[a]		
	Statistic	**Df**	**Sig.**
Innovative culture	.137	34	.103
Risk Management	.134	34	.128
Employee proactiveness	.160	34	.067
Cross functional collaboration	.131	34	.147
Healthcare performance	.138	34	.099
Board structure	.169	34	.055
a. Lilliefors Significance Correction			

Testing for non-linearity

Non-linearity was tested using the compare means test for linearity approach. In this approach, significant deviation from linearity ($p<0.05$) suggested non-linearity, particularly in cases where linearity was not initially statistically significant. The results presented in Table 4 confirm that the relationships between healthcare performance and each of the independent variables other than employee proactiveness were predominantly linear. In the case of the relationship between healthcare performance and employee proactiveness, the deviation from linearity was significant ($F19,1=3.653$, $p<0.05$). Despite a significant linear component, this result suggests that the relationship contains both linear and non-linear elements. In the main study, this will be addressed analytically by accommodating potential non-linear effects rather than assuming strict linearity.

Table 4: Linearity Test Results

			Sum of Squares	**Df**	**Mean Square**	**F**	**Sig.**
Healthcare performance * Innovative culture	Between Groups	(Combined)	15.581	23	.677	4.743	.007
		Linearity	7.507	1	7.507	52.561	.000
		Deviation from Linearity	8.074	22	.367	2.569	.062
Healthcare performance * Risk management	Between Groups	(Combined)	15.531	20	.777	6.825	.000
		Linearity	12.634	1	12.634	111.033	.000
		Deviation from Linearity	2.897	19	.152	1.340	.299
Healthcare performance * Employee proactiveness	Between Groups	(Combined)	15.833	19	.833	9.915	.000
		Linearity	10.307	1	10.307	122.629	.000
		Deviation from Linearity	5.526	18	.307	3.653	.009
Healthcare performance * Cross functional collaboration	Between Groups	(Combined)	14.850	18	.825	5.729	.001
		Linearity	12.132	1	12.132	84.251	.000
		Deviation from Linearity	2.718	17	.160	1.110	.423
Healthcare performance * Board structure	Between Groups	(Combined)	14.956	22	.680	3.642	.015
		Linearity	7.654	1	7.654	41.006	.000
		Deviation from Linearity	7.302	21	.348	1.863	.144

Testing for Heteroscedasticity / Heterogeneity

Homoscedasticity, also known as homogeneity of variance was tested using Levene statistics. Variables are homoskedastic when they have the same finite variance. Consequently, significant Levene Statistics signaled existence of heteroskedasticity / heterogeneity. Otherwise, variables were deemed to be homoskedastic. The Levene statistics presented in Table 5 confirms that variables were homoskedastic, since none of the Levene statistics had p-values below 0.05.

Table 5: Test of Homogeneity of Variances

	Levene Statistic	**df1**	**df2**	**Sig.**
Innovative culture	2.294	1	32	.140
Risk management	.121	1	32	.730
Employee proactiveness	.109	1	32	.743
Cross functional collaboration	.052	1	32	.821
Board structure	.017	1	32	.896

Assessing for Collinearity

Essentially, indicators are not interchangeable. Therefore, when using formative measurement models' collinearity is not expected. High levels of collinearity between formative indicators is associated with significant negative impacts on estimation of outer weights [26]. To assess presence of collinearity, Variance Inflation Factors (VIFs) were considered basing on recommendations that VIF values above 3.3 were indicative of collinearity issues [26]. Results of the

collinearity assessment using the pilot data (Table 6) gave hope of lack of collinearity issues in the formative indicators. All the VIF values were below the 3.3 threshold.

Table 6: Test for Collinearity

Formative Indicator	VIF
Change & Adaptability (C_A)	1.965
Emerging Trends Anticipation (ETA)	2.389
Financial Sustainability (FS)	2.074
Goal Setting (GS)	2.042
Human Resource Risk (HRR)	2.206
Information Sharing (IS)	2.621
Mismanagement Risk (MR)	2.273
Market Innovation (MTI)	2.324
Networks and Collaborations (NC)	2.048
Patient Outcomes (PO)	2.640
Product Innovation (PTI)	1.933
Quality Circles (QC)	2.234
quality of Care (Q_C)	2.454
Shared Vision (SV)	3.253
Technology Risk (TR)	1.600
Process Innovation (PSI)	2.661

Feedback

The data collection process gathered the following insights about the study based on participants views and observations. Seeking prior authority from the county health management team to pilot the instruments minimized employee reservations to participate in the study. Secondly, full disclosure of the supervisors' and researcher details on the tool boosted the credibility of the study further winning the participation of the respondents in the study. Third, the study area of investigation was current and there was clarity in the questionnaire. Fourth, availing a copy of signed consent form for the respondents to retain as an ethical consideration boosted their assurance and motivated them to complete the questionnaire. Some respondents sought some items clarifications which were ably explained by the trained research assistant. Finally, all employee cadres were represented in the study courtesy of stratified random sampling used.

Though some practitioners were busy going about their duties during morning hours, patience shall be observed on such cadres so as to complete the questionnaire at their amble time. All research assistants in the main study shall be trained about the study and accompanied by the researcher to provide more clarifications on need basis. To leverage from these attributes which add value to the quality of research, the preliminary page will be retained in the main study. From the meaningful results achieved from the small study, the proposed tool, data collection protocol and analysis are sufficient for the main study on intrapreneurship, board structure and healthcare performance with a specific focus on Sub-County hospitals in EMC.

DISCUSSION

The study results are explained in terms of research instrument ability to generate consistent results, objectively measure what's is being measured and the feasibility of PLS-SEM to analyze data in the context of a research study on intrapreneurship practices and health sector performance as moderated by the board structure in EMC subcounty hospitals.

Reliability

The first objective was to assess the consistency of the respective scales in the research instrument, to be used in the study on intrapreneurship practices, board structure and health sector performance in Sub-County hospitals in EMC. The Cronbach's alpha (α) reliability coefficient was employed to show the internal item consistency across the six constructs, including innovative culture, risk management, employee proactiveness, cross-functional collaboration, healthcare performances and board structure.

Innovative Culture

Nine items were identified to measure innovative culture as a potential entrepreneurial practice in Sub-County hospitals. Respondents were asked to use these items to rate innovative culture in the respective hospitals. The Cronbach's alpha value of 0.945 indicated that the innovative culture scale was highly reliable and left no room for discrepancies in the answers. According to Nunnally and Bernstein [27], corrected item–total correlations above 0.50 demonstrate good item discrimination, and in this study all items exceeded this threshold, indicating meaningful contributions to the innovative culture construct and justifying their retention since removing any item would not have improved the scale's reliability (Table 7).

Table 7: Item-Total Statistics for Innovative Culture

Items	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Encouraging and supporting generation of new ideas	.754	.940
Introducing new channels of information flow	.816	.936
Improving innovative solutions.	.811	.937
Supporting innovative initiatives	.843	.935
Improving systems to foster innovation.	.873	.933
Providing training programs to enhance employees' innovation skills.	.675	.945
Promoting innovative projects.	.760	.939
Providing ambience in the environment	.818	.937
Trying out new approaches and strategies to enhance healthcare delivery.	.740	.940

Equally, the coefficients of Cronbach's Alpha if any of the items was deleted do not exceed the overall alpha and meets the accepted reliability threshold of ≥0.70 as recommended by Nunnally [28]. This indicates that no item would improve the scale's internal consistency if removed. Therefore, the nine items were deemed suitable in measuring innovative culture and were subsequently retained.

Risk Management Practices

The risk management construct was measured using ten items. The overall Cronbach's alpha value was 0.928, showing a highly reliable scale. Moreover, the corrected item–total correlation values all exceeded 0.50, indicating that each item made a significant contribution to the risk management construct, and aligning with DeVellis' [29] assertion that items surpassing this threshold demonstrate good discrimination and should be retained within the scale; consequently, all ten items were maintained, as deleting any one of them would not have meaningfully improved the overall reliability.

Table 8: Item-Total Statistics for Risk Management

	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Identifying potential operational risks	.742	.920
Regular assessments of the hospital's risk profile.	.671	.923
Providing clear protocols and procedures for mitigating identified risks.	.743	.920
Providing clear policies and procedures on risk management.	.670	.923
Providing effective systems for monitoring and reporting risk-related issues.	.747	.919
Allocating adequate resources for effective risk management.	.666	.924
Training staff on role-related risk management	.748	.919
Having in place well-defined plans for addressing unexpected incidents and emergencies.	.775	.918
Providing mechanisms for refining risk management strategies.	.687	.923
Providing mechanisms for feedback on potential risks	.777	.918

Similarly, the Cronbach's Alpha if Item Deleted values did not exceed the overall alpha coefficient and met the acceptable reliability threshold of ≥0.70 recommended by Nunnally [28]. This indicates that none of the items weakened the internal consistency of the scale, thereby justifying the retention of all ten risk management items since removing any item would not have yielded a meaningful improvement in reliability.

Employees' Proactiveness

Healthcare employees' proactiveness was measured using nine items, and the resulting Cronbach's alpha of 0.920 exceeded the recommended minimum threshold of 0.70 suggested by Hair *et al.,*[30], demonstrating a high level of internal consistency among the items. According to DeVellis, corrected item–total correlations above 0.50 indicate good item discrimination and justify retaining the item within the scale [29]. In this study, all corrected item–total correlation values exceeded this threshold, confirming that each item contributed strongly to the healthcare employees' proactiveness construct (Table 9). Evaluated against established reliability benchmarks the Cronbach's Alpha if Item Deleted values did not surpass the overall alpha, demonstrating that the scale had reached its reliability ceiling and that removing any item would not enhance its internal consistency.

Table 9: Item-Total Statistics for Employees' Proactiveness

	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Identifying and addressing potential challenges or issues.	.764	.908
Seeking out new opportunities and initiatives to improve services delivery	.812	.904
Anticipating and adapting to changes in the industry.	.624	.917
Taking initiative to engage in professional development	.682	.913
Encouraging colleagues in their roles and responsibilities.	.765	.907
Engaging external stakeholders	.783	.906
Seeking feedback from patients and staff for service delivery improvement.	.600	.919
Fostering a culture of continuous improvement in my facility	.742	.910
Seeking better patient care and outcomes.	.706	.912

Cross-Functional Collaborations

According to Hair *et al*., a Cronbach's alpha value of 0.90 or higher indicates excellent internal consistency within a measurement scale [30]. Cross-functional collaboration was measured using ten items, and the resulting Cronbach's alpha of 0.932 exceeded this benchmark, demonstrating that the scale was highly reliable overall. As DeVellis notes, corrected item–total correlations above 0.50 indicate adequate item discrimination [29]. All items in this construct exceeded this benchmark, confirming their meaningful contribution to the cross-functional collaboration construct (Table 10). Additionally, the Cronbach's Alpha if Item Deleted results showed no reliability gains from removing any item, supporting the retention of all ten items.

Table 10: Item-Total Statistics for Cross-Functional Collaborations

	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Providing information on ongoing initiatives within the hospital.	.791	.922
Seeking collaboration and information sharing between departments	.622	.930
Providing enabling environment for sharing emerging ideas.	.635	.929
Fostering a multidisciplinary approach to Entrepreneurial activities	.729	.925
Holding regular inter-departmental deliberations on income generating projects.	.616	.931
Inclusivity in decision-making	.798	.922
Promoting freedom of expression among employees	.707	.926
Sharing information on ongoing projects across departments.	.862	.918
Recognizing employee contributions to the hospital success irrespective of the department they belong to.	.773	.923
Providing feedback mechanism for assessing inter-departmental cooperation	.797	.921

Healthcare Performance

The healthcare performance construct was measured using ten items. The computed Cronbach's alpha value of 0.929 was way above the 0.7 threshold and indicated that the scale for healthcare performance was highly reliable. According to DeVellis, corrected item–total correlations above 0.50 indicate adequate item discrimination and support item retention [29]. In this study, all items surpassed this threshold, demonstrating strong unidimensionality in measuring the healthcare performance construct (Table 11). Similarly, the Cronbach's Alpha if Item Deleted values showed no reliability improvement from removing any item, justifying the retention of all ten items.

Table 11: Item-Total Statistics for Healthcare Performance

	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Consistently meeting quality standards and patient satisfaction levels.	.778	.918
Demonstrating efficient and effective utilization of resources	.691	.923
Achieving positive health outcomes for patients.	.804	.917
Effectively addressing the healthcare needs of the community.	.658	.924
Demonstrating strong collaboration and coordination among healthcare stakeholders.	.760	.919
Maintaining a positive reputation for delivering quality healthcare services.	.721	.922
Meeting financial obligations sustainably.	.684	.924

Effectively managing risks and addressing challenges in the healthcare sector.	.699	.922
Keeping up with technological advancements and adopting innovative healthcare solutions.	.720	.922
Demonstrating continuous improvement and learning in operations.	.745	.920

Board Structure

The final construct, board structure, was measured using fifteen items, and the Cronbach's alpha of 0.933 indicated excellent internal consistency. As reliability values above 0.90 are considered highly dependable [29], the scale was deemed robust and justified for use in the study. According to DeVellis (2017), corrected item–total correlations above 0.50 indicate acceptable item discrimination, and in this study all items met this threshold, demonstrating their collective contribution to the board structure construct (Table 18). Likewise, Hair *et al.,* note that Cronbach's alpha values of 0.90 and above reflect excellent reliability and any item deletion offers no meaningful improvement [30]. Consistent with this guideline, the Cronbach's Alpha if Item Deleted values did not exceed the overall alpha, justifying the retention of all fifteen items.

Table 12: Item-Total Statistics for Board Structure

	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
The hospital board consists of members with diverse professions.	.500	.933
The hospital board consists of at least one third of either gender.	.738	.927
The ethnic minority are considered when composing the hospital board.	.581	.932
The skills and expertise of board members align with the strategic needs of the hospital.	.565	.931
Board members maintain a level of independence from the hospital's executive management, ensuring objective decision-making.	.738	.927
The board represents the diverse interests of stakeholders, including patients, staff, and the broader community.	.603	.931
The board conducts regular evaluations to assess its performance, identify areas for improvement, and ensure effectiveness.	.702	.928
The board is endowed with diverse professionals for effective oversight.	.712	.928
The board is ideal in size for effective decision making.	.736	.927
Board members actively participate in the hospital's strategic planning processes, providing valuable insights.	.623	.930
The board aligns its governance practices and policies to support and encourage entrepreneurship.	.759	.926
The board ensures the availability of necessary resources and support for entrepreneurship initiatives.	.796	.925
The board exhibits a willingness to take calculated risks associated with entrepreneurship practices.	.672	.929
The board requires management to provide regular reports on the progress and outcomes of entrepreneurship initiatives.	.689	.928
The board provides feedback and guidance to management to enhance the effectiveness of entrepreneurship practices.	.668	.929

Validity

After the supervisors and healthcare professionals confirmed that the items were suitable in structure to measure the constructs on intrapreneurship practices, board structure and health sector performance in EMC Sub-County hospitals, the content was confirmed to extensively cover the respective constructs scales and had support in existing discourse. The six constructs were then subjected to construct validation using explanatory factor analysis (EFA), yielding the following findings.

Innovative Culture

The PCA results revealed that the data for innovative culture had an acceptable level of sampling adequacy, with a Kaiser–Meyer–Olkin (KMO) value of 0.793. According to Kaiser, KMO values between 0.70 and 0.79 fall within the middling range, indicating that the dataset is suitable for factor analysis [31]. Similarly, the highly significant Bartlett's Test of Sphericity (χ^2 = 219.045, $p < 0.001$) confirmed the presence of sufficient inter-item correlations needed to justify factor extraction, in line with Bartlett's criterion [32]. Although the construct exhibited a multidimensional configuration, the close conceptual alignment of the three components; process, product, and market innovation reflected sufficient coherence to support an overarching

unidimensional interpretation of innovative culture, consistent with recommendations that conceptually related dimensions may form a higher-order construct [33] (Table 13).

Table 13: Rotated Component Matrix for Innovative Culture

	Component		
	1	2	3
Supporting innovative initiatives	.832		
Encouraging and supporting generation of new ideas	.805		
Improving innovative solutions.	.739		
Improving systems to foster innovation.	.632		
Providing ambience in the environment		.851	
Trying out new approaches and strategies to enhance healthcare delivery.		.804	
Introducing new channels of information flow		.704	
Promoting innovative projects.			.899
Providing training programs to enhance employees' innovation skills.			.590
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.			
a. Rotation converged in 9 iterations.			

Construct validity for the innovative culture scale was further supported by a three-factor solution that accounted for 80.68% of the total variance. According to Hair *et al*., variance explained above 60% is indicative of a strong factor structure in social science research, thereby confirming that the extracted factors adequately represented the underlying construct [30].

Risk Management Practices

Similarly, validation of the risk management construct indicated acceptable construct validity, with the Kaiser–Meyer–Olkin (KMO) value of 0.766 falling within the middling range recommended by Kaiser [33], and a highly significant Bartlett's Test of Sphericity ($\chi^2 = 267.018$, $p < 0.001$) confirming adequate inter-item correlations for factor extraction [32]. According to DeVellis, conceptually related dimensions identified through factor analysis may collectively represent a single underlying construct [29]. In this study, PCA yielded three factor components; human resource risk, technological risk, and mismanagement risk demonstrating a multidimensional structure of risk management (Table 21). The rotated component matrix showed strong and clean loadings across all items, with coefficients ranging from .639 to .882, all exceeding the recommended minimum threshold of 0.50 for practical significance in factor analysis [30]. Although the three components reflect distinct domains of human resource, technological, and mismanagement risks, their strong conceptual relatedness, as evidenced by consistently high factor loadings provides sufficient coherence to justify treating risk management as a unidimensional construct. Thus, the extraction of these components not only supports the multidimensional conceptualization of risk management but also reinforces the construct validity of the overall scale.

Table 14: Rotated Component Matrix for Risk Management

	Component		
	1	2	3
Providing clear protocols and procedures for mitigating identified risks.	.882		
Providing clear policies and procedures on risk management.	.856		
Providing effective systems for monitoring and reporting risk-related issues.	.835		
Allocating adequate resources for effective risk management.	.674		
Regular assessments of the hospital's risk profile.		.846	
Identifying potential operational risks		.817	
Training staff on role-related risk management		.699	
Providing mechanisms for refining risk management strategies.			.869
Having in place well-defined plans for addressing unexpected incidents and emergencies.			.775
Providing mechanisms for feedback on potential risks			.639
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.			

Together, the three components accounted for 81.75% of the total variance, surpassing the 60% benchmark recommended by Hair *et al.,* for establishing a strong and reliable factor structure in social science research [30]. This high cumulative variance indicates that the three components; human resource risk, technological risk, and mismanagement risk capture a substantial proportion of the underlying variance in the data. Consequently, the results confirm that these three

components adequately and comprehensively represent the overall risk management construct.

Employees Proactiveness

Similarly, validation of the employee proactiveness construct demonstrated acceptable construct validity, with a Kaiser–Meyer–Olkin (KMO) value of 0.775, falling within the middling range recommended by Kaiser [31]. In addition, Bartlett's Test of Sphericity was highly significant ($\chi^2 = 197.197$, df = 36, $p < 0.001$), confirming that the inter-item correlations were adequate for factor extraction [32]. These findings indicate that the dataset was suitable for factor analysis and support the appropriateness of extracting latent dimensions underlying employee proactiveness.

PCA identified three distinct components underlying the employee proactiveness construct, reflecting its multidimensional nature (Table 15) with dimensions of employee proactiveness: ownership and initiative, goal-oriented improvement and emerging opportunities, and adaptability to change and external engagement. The rotated component matrix showed clear item clustering, with factor loadings between .557 and .876, all above the .50 benchmark recommended by Hair *et al.,*[30]. Despite representing distinct aspects of proactive behavior, they consistently loaded highly indicating a strong conceptual convergence, thereby supporting the construct validity and internal coherence of the proactiveness scale.

Table 15: Rotated Component Matrix for Employee Pro-activeness

	Component		
	1	**2**	**3**
Encouraging colleagues in their roles and responsibilities.	.876		
Identifying and addressing potential challenges or issues.	.849		
Taking initiative to engage in professional development	.814		
Fostering a culture of continuous improvement in my facility		.841	
Seeking feedback from patients and staff for service delivery improvement.		.781	
Seeking better patient care and outcomes.		.772	
Seeking out new opportunities and initiatives to improve services delivery		.557	
Anticipating and adapting to changes in the industry.			.842
Engaging external stakeholders			.592
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.			
a. Rotation converged in 6 iterations.			

Together, the three components accounted for 80.03% of the total variance, surpassing the 60% benchmark recommended by Hair *et al.,*[30] for establishing a strong and reliable factor structure in social science research. This high cumulative variance indicates that the three components: ownership and initiative; goal-oriented improvement and emerging opportunities; and adaptability and external engagement capture a substantial proportion of the underlying variance in employee proactiveness. Consequently, the results confirm that these three components adequately and comprehensively represent the overall employee proactiveness construct.

Cross-functional Collaboration

Assessment of the cross-functional collaboration construct showed that the data met the necessary conditions for factor analysis. The Kaiser–Meyer–Olkin (KMO) statistic was 0.764, indicating an acceptable level of sampling adequacy based on Kaiser's classification [31]. Further confirmation was provided by Bartlett's Test of Sphericity, which produced a highly significant result ($\chi^2 = 275.172$, df = 45, $p < 0.001$), demonstrating that the correlation matrix was suitable for identifying underlying factor patterns [32].

Although four separate components emerged from the analysis, the strong conceptual relationship among shared vision, information sharing, networks and collaborations, and quality circles indicates that these elements operate collectively within a unified behavioral framework. Rather than functioning as isolated dimensions, they represent interconnected aspects of how departments work together, communicate, and align their efforts. This interconnectedness supports viewing cross-functional collaboration as a single higher-order construct, consistent with the argument that closely related subdimensions may aggregate into an overall composite factor [33] (Table 16).

Table 16: Rotated Component Matrix for Cross-functional Collaboration

	Component

	1	2	3	4
Recognizing employee contributions to the hospital's success irrespective of the department they belong to.	.873			
Providing feedback mechanism for assessing inter-departmental cooperation	.776			
Inclusivity in decision-making				
Holding regular inter-departmental deliberations on income generating projects.		.839		
Promoting freedom of expression among employees		.778		
Fostering a multidisciplinary approach to Entrepreneurial activities		.584		
Seeking collaboration and information sharing between departments			.923	
Providing information on ongoing initiatives within the hospital.			.653	
Providing enabling environment for sharing emerging ideas.				.901
Sharing information on ongoing projects across departments				
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a. Rotation converged in 7 iterations.				

As factor analysis yielded a four-factor structure comprising information sharing, networks and collaboration, quality circles, and shared vision, which collectively accounted for 87.52% of the total variance, surpassing recommended thresholds for a strong factor solution.

During the item evaluation process, however, two items: inclusivity in decision-making and sharing information on ongoing projects across departments were identified as redundant because they did not meet standard factor-retention criteria. Neither item reached the minimum .50 primary loading, and both showed cross-loadings above .30, indicating inadequate discriminant clarity [30]. As these items failed to load meaningfully onto any of the four components and added limited conceptual value, they will be removed from the final instrument to enhance clarity and reliability in the main study.

Healthcare Performance

Evaluation of the board structure construct showed that the data were appropriate for factor analysis. The Kaiser–Meyer–Olkin (KMO) statistic of 0.726 indicated an acceptable level of sampling adequacy based on Kaiser's criteria [31]. Bartlett's Test of Sphericity was statistically significant ($\chi^2 = 377.765$, df = 105, $p < 0.001$), demonstrating that the correlations among items were sufficient for dimensionality reduction.

Although three distinct components emerged from the factor analysis, the strong conceptual linkages among the dimensions of patient outcomes, quality of care, and financial sustainability suggest that they operate collectively within an integrated healthcare performance framework. Rather than functioning as independent domains, these components reflect interconnected aspects of how healthcare institutions deliver outcomes, maintain service standards, and manage resources effectively. This interdependence supports interpreting healthcare performance as a unified higher-order construct, consistent with the view that closely aligned subdimensions can form an overarching composite factor [33] (Table 17). The rotated solution, which converged in nine iterations, further demonstrates the stability and coherence of this structure.

Table 17: Rotated Component Matrix for Healthcare Performance

	Component		
	1	2	3
Effectively addressing the healthcare needs of the community.	.788		
Demonstrating strong collaboration and coordination among healthcare stakeholders.	.776		
Achieving positive health outcomes for patients.	.548		
Maintaining a positive reputation for delivering quality healthcare services.		.799	
Meeting financial obligations sustainably.		.755	
Demonstrating continuous improvement and learning in operations.		.735	
Effectively managing risks and addressing challenges in the healthcare sector.			
Keeping up with technological advancements and adopting innovative healthcare solutions.			.794
Demonstrating efficient and effective utilization of resources			.770
Consistently meeting quality standards and patient satisfaction levels.			.623
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a. Rotation converged in 9 iterations.			

The rotated factor solution for the healthcare performance construct converged in nine iterations, producing a stable three-component structure. As shown in Table 17, the three components together accounted for

74.83% of the total variance, indicating a strong factor solution suitable for social science research. This level of cumulative variance exceeds commonly recommended thresholds for acceptable construct representation and affirms the adequacy of the three-factor configuration in capturing the underlying dimensions of healthcare performance. During the item evaluation process, however, two indicators measuring healthcare performance were identified as redundant because they did not satisfy standard factor-retention criteria; neither achieved the minimum .50 primary loading, and both exhibited cross-loadings above .30, indicating insufficient discriminant clarity [30]. As these items failed to load meaningfully onto any of the three components and added limited conceptual value, they will be removed from the questionnaire for the extensive research study to enhance clarity and reliability of the final instrument.

Board Structure

The last construct, board structure achieved a middling sampling adequacy (KMO=0.726) and was suitable for PCA (χ^2=377.765, p<0.001). The construct had a two-factor unidimensional structure, with the factors namely: board composition and board capacity accounting for 60.38% of the total variance in the construct. This confirms that there was need to consider other board structure indicators to improve the total variance explained. In hindsight, the extensive research study will incorporate board oversight (BO), board independence (BI), and resource allocation (RA) as additional indicators for board structure.

Although two distinct components emerged from the analysis, the close conceptual alignment among the indicators for board composition and board capacity suggests that these dimensions function cohesively within a unified governance framework. Rather than representing separate and independent domains, the factors reflect complementary aspects of how the board provides strategic leadership, oversight, independence, and support for entrepreneurship within the hospital. High loadings of the first component demonstrate the board's structural and functional composition, while the strong loadings on component 2 highlight its operational capacity. The interconnectedness of these elements indicates that board composition and board capacity jointly shape a coherent governance system, supporting the treatment of board structure as a single higher-order construct. This interpretation aligns with the view that closely related subdimensions may aggregate to form a composite factor when they reflect a shared overarching purpose [33] (Table 18).

Table 18: Rotated Component Matrix for Board Structure

	Component	
	1	**2**
Board members actively participate in the hospital's strategic planning processes, providing valuable insights.	.894	
The board is ideal in size for effective decision making.	.815	
The board represents the diverse interests of stakeholders, including patients, staff, and the broader community.	.751	
The board conducts regular evaluations to assess its performance, identify areas for improvement, and ensure effectiveness.	.740	
The board aligns its governance practices and policies to support and encourage entrepreneurship.	.722	
The board ensures the availability of necessary resources and support for entrepreneurship initiatives.	.657	
The board is endowed with diverse professionals for effective oversight.	.618	
Board members maintain a level of independence from the hospital's executive management, ensuring objective decision-making.	.557	
The hospital board consists of at least one third of either gender.	.528	
The board provides feedback and guidance to management to enhance the effectiveness of entrepreneurship practices.		.890
The board requires management to provide regular reports on the progress and outcomes of entrepreneurship initiatives.		.886
The board exhibits a willingness to take calculated risks associated with entrepreneurship practices.		.850
The hospital board consists of members with diverse professions.		.502
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.		
a. Rotation converged in 3 iterations.		

Together, the two extracted components accounted for 60.38% of the total variance, meeting the minimum threshold recommended by Hair *et al.,*[30] for an acceptable factor solution in social science research. While the two components of board composition and board capacity capture key aspects of governance, the moderate cumulative variance suggests the need for a more comprehensive set of indicators. This confirmed the need to consider other board structure indicators to improve the total variance explained. Scholarly literature

identifies board oversight, board independence, and resource allocation as essential governance dimensions. Board oversight supports effective monitoring of managerial actions [34], board independence enhances objective decision-making [35], and resource allocation enables boards to support strategic priorities [36]. This hindsight confirms that, the extensive research study will incorporate board oversight (BO), board independence (BI), and resource allocation (RA) as additional indicators for board structure. Accordingly, these additional dimensions will be integrated into the extensive research study to strengthen the conceptual coverage of the board structure construct

Feasibility of PLS-SEM in Analysis

The feasibility of using PLS-SEM in analysis to conduct extensive research on the relationship between latent variables of intrapreneurship practices and health sector performance as moderated by the board structure in EMC subcounty hospitals with specific research objectives was determined by evaluating both outer model and the inner model. The outer models were evaluated in order to examine the suitability of the formative indicators in defining the respective constructs. Having confirmed that there were no collinearity issues in the formative indicators as all the VIF values were below the 3.3 threshold, the significance and relevance of the formative indicators was tested using outer weights. In the event that the outer weight was not significant, the formative indicator's outer loading was analyzed and retained if found to be above 0.5 even if it was not statistically significant. Otherwise, the indicator was considered for removal or deletion.

From the results, seven indicators, including change & adaptability, financial sustainability, mismanagement risk, market innovation, product innovation, shared vision, and technology risk had outer weights that were statistically significant and were retained and interpreted in terms of the absolute and relative sizes of these weights. In contrast, the remaining nine formative indicators had non-significant outer weights, yet the outer loadings were above 0.5. All the outer loadings were also statistically significant. Therefore, the nine indicators were retained and interpreted using their outer weights.

Table 19: Outer Weights and Loadings

Formative Indicator	Original Sample (O) Outer Weight	p-value	Original Sample (O) Outer loading	p-value
C_A -> Employee proactiveness	0.649	0.001		
ETA -> Employee proactiveness	0.199	0.310	0.826	0.000
FS -> Healthcare performance	0.717	0.000		
GS -> Employee proactiveness	0.274	0.260	0.802	0.000
HRR -> Risk management	0.249	0.161	0.834	0.000
IS -> Cross functional collaboration	-0.063	0.754	0.758	0.000
MR -> Risk management	0.502	0.009		
MTI -> Innovative culture	0.930	0.000		
NC -> Cross functional collaboration	-0.020	0.906	0.699	0.000
PO -> Healthcare performance	0.362	0.091	0.853	0.000
PTI -> Innovative culture	0.358	0.036		
QC -> Cross functional collaboration	0.454	0.066	0.884	0.000
Q_C -> Healthcare performance	-0.001	0.995	0.738	0.000
SV -> Cross functional collaboration	0.695	0.025		
TR -> Risk management	0.402	0.031		
PSI -> Innovative culture	-0.250	0.457	0.679	0.000

This implies that, all the indicators of the constructs are significantly related to the constructs as evidenced by statistically significant loadings supporting the measurement model with very strong theoretical justifications in existing discourse and all indicators shall be retained in the main study.

Implications for Main Study

This pilot study has served as a good rehearsal for the main study and provided more insights on the research design, execution and interpretation of results. Based on the findings of the pilot study, several implications for the main study were discerned. The data collection method was effective implying that the proposed data collection methods will also be effective enough when employed in the large-scale study to be carried out in Sub- County hospitals in EMC. Specifically, the questionnaire leaves very little room for missing data, an indication of the coherence in the scale items. Secondly, all scales in the questionnaire are likely not to attract multivariate outliers. However, caution may need to be practiced with the cross-functional collaboration scale that may have some univariate outliers.

The validity and reliability results imply that the Likert scales used in the questionnaire will be appropriate in measuring the respective constructs. In particular, the finding showing Cronbach's alpha values above 0.7 for all constructs in the pilot study implies that the items measuring each of those constructs are

dependable, and will yield consistent results in the large-scale study. Secondly, the pilot study KMO values lying in the middling or meritorious categories imply that all the three main variables to be used in the large-scale study will likely have a high proportion of common variance allowing for factor analysis. Also, the PCA results showing some redundant items in the cross-functional and healthcare performance constructs implies that the large-scale study can omit those redundant items. Finaly, the small proportion of the variance explained by the two board structure indicators implies that the board structure construct for the large-scale study may require more indicators.

The results from data diagnostics, descriptive statistics, inner model, and the moderation model imply that both the questionnaire and the PLS-SEM approach are feasible to conduct a large-scale research study on intrapreneurship practices, board structure and health sector performance in the context of Sub-County hospitals in EMC. In particular, the descriptive results showing various ratings imply that the questionnaire will be feasible in capturing the diverse opinions of the large-scale sample through their ratings. Secondly, the data diagnostics results, inner model results and moderation results featured through path coefficients imply that the PLS-SEM approach is feasible in computing the outer models to verify the suitability of the formative indicators, and will also doubtlessly show the direct effects of the intrapreneurship practices on healthcare performance as well as, the moderating role of board structure

In conclusion, a bigger proportion of this pilot research framework will be maintained with few important issues adjusted in the main study. There were no barriers in recruiting participants and similar recruitment protocol will be maintained. Informed consent on the data collection instrument boosted the confidence and assured the respondents resulting to an insignificant variability between the anticipated and actual observations and the proposed sample size will be retained at 236 health department employees in various professional and administrative roles within Subcounty hospitals in EMC. Reviewed research questions on a five-point Likert scale will be used to collect quantitative data from respondents. There were no ethical breaches hence data collection will be managed under the same cost-effective protocol with the respondents identified using stratified random sampling to give all cadres equal chances of participation in order to generate a representative data. The primary data collection instrument will be the structured questionnaire due to its scalability and cost-effectiveness. Quantitative data collected will be analyzed using PLS-SEM as its feasible in the intended setting and ideal with the small study population. This pilot study, demonstrated the research to be feasible and gives hope for a potential success of the main study hence strong justification for proceeding with the full-scale research.

Proposed Modifications

In view of the findings made, and the subsequent implications for the main study, the following modifications will be made.

i) Questionnaire structure

The first modification will target the questionnaire structure, to ensure:

a.) That all the scale items are given ample and equal spacing, and

b.) That the two items “inclusive decision making” and “sharing information on ongoing projects across departments” in the cross-functional collaboration construct; and the item “effectively managing risks and addressing challenges in the healthcare sector” in the healthcare performance construct are omitted from the large-scale study questionnaire.

ii) Indicator structure

The second modification focused on indicator structure to ensure that the board structure construct was defined by three more formative indicators namely; board oversight (BO), board independence (BI), and resource allocation (RA) to improve the total variance explained in the board structure construct.

Limitations

Some limitations were noted mainly based on the research design and methodology employed in the study. Reliance on questionnaire as the principal tool for data collection, denied the researcher room to control the environment. First in its rigid and fixed nature, the questionnaire items and response options were predetermined, denying participants room to explain their perspectives. Secondly, being used on a small sample of 24 participants opened room for questioning the representativeness of data collected. Use of the PLS-SEM approach led to the potential of several limitations including inability to comprehensively assess the model’s goodness of fit for lack of universally acceptable goodness of fit-standard. Secondly, the pilot study’s small sample size of 24 offered potential for biased parameters and lack of rigorous assumptions opened room for inaccurate path coefficients.

Future Directions

A large-scale study on intrapreneurship practices, board structure and health sector performance will be undertaken in EMC subcounty hospitals using the proposed questionnaire (with modifications) and adopting stratified random sampling protocol to identify respondents, and data collected analyzed using the higher order regression (PLS-SEM). This study will employ a larger sample to yield a more stable results to inform decision making in the sector. More indicators of the board structure construct including board independence, resource allocation and board oversight should be used in future studies to enhance its variance explained on

interaction with other variables. A small sample size of 24 respondents used in the pilot may not have generated a representative data. In the main study, a relatively larger sample will be considered to ensure a more reliable generalization of the study.

CONCLUSION

This pilot study examined the viability of a developed questionnaire to conduct a large-scale research study in Sub-County hospitals in EMC to establish how intrapreneurship practices would affect the performance of the health sector, and the moderating role of the board structure on this effect. Therefore, based on the findings it was concluded that the developed questionnaire is an effective tool for data collection both in structure and content albeit some missing data, univariate outliers, and board structure indicators explaining little variance. The scale items were consistent in measuring the respective constructs and would be dependable for the large-scale study. Both the questionnaire and the PLS-SEM approach were found to be feasible to conduct a large-scale research study on intrapreneurship practices, board structure and health sector performance in the context of Sub-County hospitals in EMC; with the questionnaire capable of capturing diverse opinions from participants and the PLS-SEM approach ably validating the outer and inner models in the direct effect and with the moderating effect of the board structure.

RECOMMENDATIONS

Following results showing some cases with missing data, univariate outliers, redundant items and board structure indicators explaining little variance in the construct, some amendments on the indicator structures and questionnaire structure are hereby sought from the faculty to modifying the questionnaires with equal spacing for all scale items, redundant items deleted, and the indicators of the board structure enhanced to be rolled out in the main study. The data collected will be analyzed subsequently and a report written within the stipulated timeline.

REFERENCES

1. World Health Organization. (2025, March 26). Universal health coverage (UHC). World Health Organization.
2. Di Pietro, L., Piaggio, D., Oronti, I., Maccaro, A., Houessouvo, R. C., Medenou, D., … & Ahluwalia, A. (2020). A Framework for Assessing Healthcare Facilities in Low-Resource Settings: Field Studies in Benin and Uganda. *Journal of Medical and Biological Engineering, 40*(4), 526-534.
3. Romeike, B. F. M., Lang, J., Stosch, C., Moritz, S., Behrends, M., Lemos, M., Mink, J., &Tolks, D. (2024). Barcamps or unconferences as an emerging paradigm in medical education: Insights from a pilot and feasibility mixed methods study. *PLOS ONE*, *19*(8), e0309103.
4. Babu, A., Joseph, A. P., Bose, J., & Sarathy, K. (2025). Reimagining Adolescent Wellbeing through Yoga as a Public Health Paradigm. *Frontiers in Psychiatry, 16,* 1691915.
5. Ashal, N., Masa'deh, R., &Twaissi, N. M. (2023). The Impact of Learning Organization on Intrapreneurship: The Case of Jordanian Pharmaceutics. *Sustainability*, *15*(16), 12211.
6. Burkholder, P., & Hulsink, W. (2022). Academic intrapreneurship for health care innovation: the importance of influence, perception, and time management in knowledge commercialization at a University's Medical Centre. *The Journal of Technology Transfer*.
7. Dion, H., & Evans, M. (2023). Strategic frameworks for sustainability and corporate governance in healthcare facilities: approaches to energy-efficient hospital management. *Benchmarking: An International Journal*, *31*(2), 353–390.
8. Jalilvand, M., Raeisi, A. R., &Shaarbafchizadeh, N. (2024). Hospital governance accountability structure: A scoping review. *BMC Health Services Research*, *24*(1).
9. Kumar, A., Pandey, A., Kanwal, P., & Le, T. M. (2025). Intrapreneurship and Career Advancement. *Advances in Higher Education and Professional Development*, 269–300.
10. Moss, P., Hartley, N., & Russell, T. (2022). Integration intrapreneurship: implementing innovation in a public healthcare organization. *Journal of Innovation and Entrepreneurship*, *11*(1).
11. Ramesh, H. (2023). A framework for corporate innovation management and managerial innovation in medical devices industry. *Lutpub.lut.fi*.
12. Urban, B., &Maboko, P. (2020). Corporate sustainability: a focus on entrepreneurship, collaboration and regulation in the South African healthcare industry. *International Journal of Innovation and Sustainable Development*, *14*(2), 199.
13. Treece, C. (1982). DSM-III as a research tool. *The American journal of psychiatry*, *139*(5), 577-583.
14. Cochran, W. G. (1977). *Sampling Techniques*. Wiley & Sons, Inc.
15. Hair, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., & Ray, S. (2021). Partial Least Squares Structural Equation Modeling (PLS-SEM) Using R. In *Classroom Companion: Business*. Springer International Publishing.
16. Filardi, E. T. M., Pucca, M. B., Araujo Junior, J. P., & da Costa, P. I. (2024). Pandemic paradox: the impact of the COVID-19 on the global and Brazilian tuberculosis epidemics. *Frontiers in Public Health*, *12.* https://doi.org/10.3389/fpubh.2024.1399860
17. Rosenkranz, B. (2024). Drug outcomes research and policies – trends and challenges. *Frontiers in Pharmacology*, *15*. https://doi.org/10.3389/fphar.2024.1476849
18. Fischer, F. B. (2024). *The epidemiology of Legionnaires' disease in Switzerland: A re-*

emerging disease (pp. 1–294) (Doctoral dissertation, UNIBAS)
19. Shawky, M., Mostafa, M. G., Mahmoud, F. Z., shaban, M., & Mahmoud, S. A. (2024). Nurse managers' managerial innovation and it's relation to proactivity behavior and locus of control among intensive care nurses. *BMC Nursing*, *23*(1). https://doi.org/10.1186/s12912-024-02084-8
20. Abdrabou, H., &ghonem, N. E. (2023). Effect of Pro-Innovative Characteristics on Nurses' Innovative Behavior and Their Perceived Work Role Performance. *Assiut Scientific Nursing Journal (Print)*, *0*(0). https://doi.org/10.21608/asnj.2023.195902.1529
21. D'Souza, D. E., Bement, D., & Cory, K. (2022). Cross-functional integration skills: Are business schools delivering what organizations need? *Decision Sciences Journal of Innovative Education*. https://doi.org/10.1111/dsji.12262
22. Yin, Z., Caldas, C., de Oliveira, D., Kermanshachi, S., &Pamidimukkala, A. (2023). Cross-functional collaboration in the early phases of capital projects: Barriers and contributing factors. *Project Leadership and Society*, *4*, 100092. Sciencedirect. https://www.sciencedirect.com/science/article/pii/S2666721523000133
23. Albi, T., & Suresh, M. (2022). Readiness for Agility Adaptability and Alignment in Healthcare Organizations. *IISE Transactions on Healthcare Systems Engineering*, *13*(2), 1–22. https://doi.org/10.1080/24725579.2022.2144966
24. Rastoka, J., Petković, S., &Radicic, D. (2022). Impact of Entrepreneurship on the Quality of Public Health Sector Institutions and Policies. *International Journal of Environmental Research and Public Health*, *19*(3), 1569. https://doi.org/10.3390/ijerph19031569
25. Ortiz-Hunt, A., & Lerner, D. (2019). Sustainable Human Healthcare: The Centrality of Intrapreneurial Nurses. *Academy of Management Proceedings*, *2019*(1), 12403–12403.
26. Sarstedt, M., Hair, J. F., Pick, M., Liengaard, B. D., Radomir, L., & Ringle, C. M. (2022). Progress in partial least squares structural equation modeling use in marketing research in the last decade. Psychology & Marketing, 39(5). https://doi.org/10.1002/mar.21640
27. Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory.* New York: McGraw-Hill.
28. Nunnally, J. C. (1978). An overview of psychological measurement. In B. B. Wolman (Ed.). *Clinical diagnosis of mental disorders: A handbook* (pp. 97-146). Boston, MA: Springer.
29. DeVellis, R. F. (2017). *Scale Development: Theory and Applications.* Los Angeles, CA: Sage Publications.
30. Hair, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Apraiz, C. J., Capeda-Carion, G., &Roldan, J. L. (2019). *Manual of Partial Least Squares Structural Equation Modelling (PLS-SEM)* (2nd ed.). Barcelona: OmniaScience.
31. Kaiser, H. F. (1974). An index of factorial simplicity. *psychometrika*, *39*(1), 31-36.
32. Bartlett, M. S. (1954). Significance Test of Sphericity of a Normal n-variate Distribution. *Journal of the Royal Statistical Society, 16*, 296-298.
33. Kline, B., & Tamer, E. (2016). Bayesian inference in a class of partially identified models. *Quantitative Economics*, *7*(2), 329-366.
34. Zahra, S. A., & Pearce, J. A. (1989). Boards of Directors and Corporate Financial Performance: A Review and Integrative Model. *Journal of Management, 15*(2), 291-334.
35. Fama, E. F., & Jensen, M. C. (1983). Separation of Ownership and Control. *The Journal of Law and Economics, 26*(2), 301-325.
36. Hillman, A. J., & Dalziel, T. (2003). Boards of directors and firm performance: Integrating agency and resource dependence perspectives. *Academy of Management review*, *28*(3), 383-396.