Strategic Role of Government, Size and Open Innovation Among Science and Technology Parks in Africa

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Abstract

Open innovation is known to be a key driver of sustainable development, fostering collaboration and partnerships among key stakeholders. This study examined the impact of strategic role of government on open innovation and the moderating role of Science and Technology Parks (STPs) size. Using a cross-sectional descriptive research design, targeting 70 managers from 14 Science and Technology Parks, the study collected primary data using structured email questionnaire. The tool was evaluated for internal consistency using Cronbach alpha coefficient and for numerical construct validity using Kaiser-Meyer Olkin Coefficient. Data was tested for regression assumptions and linear discriminant analysis was used to test the hypothesis. The study found that linear discriminant analysis model had an associated canonical correlation of 0.962 and Wilks' Lambda of 0.110 with well differentiated functions at group centroids. The study further found that the strategic role of government explained approximately 92.54% of the variations in open innovation classifications among Science and Technology Parks in Africa. The hit ratio for the confusion matrix and Jack-Knief classifications achieved 90% correct classifications for both initial and the cross-validated group cases. STP size did not have a statistically significant influence on the relationship between strategic role of government and open innovation. This study recommends that government policy, financing mechanisms and promotional role should not be significantly differentiated across different STP sizes. In order to enhance innovations, stakeholders should not regard STP size as bottleneck towards effective engagement & collaborations and instead, should consider STPs as equal partners in the innovation ecosystems.

Keywords: open innovation, promotional role, linear discriminant, science and technology park.

1 Introduction

1.1 Background of the Study

Open innovation has gained significant traction worldwide. A study by PricewaterhouseCoopers (PwC) (2018), found that 61% of Chief Executive Officers worldwide consider open innovation critical for their organization's success, indicating the growing importance of external collaboration. According to a Capgemini report (2021), 80% of companies globally have adopted some form of open innovation practice, with Europe leading at 85%, followed by North America at 78%, and Asia-Pacific at 75%. In the technology sector, over 70% of companies, according to Deloitte, have integrated open innovation into their research and development (R&D) strategies, with a strong focus on collaborating with startups and academic institutions. The European Commission estimates that open innovation could contribute up to €500 billion to the European economy by 2025, highlighting its socio-economic significance.

While the global literature has extensively examined open innovation in various contexts (Laursen & Salter, 2006; West & Bogers, 2014), there is a notable scarcity of empirical studies that focus on the African context, particularly within the dynamic environment of STPs. STPs serve as prime platforms for facilitating multidirectional connections for open innovation among diverse entities such as large corporations, start-ups, research labs, universities, and Small and Medium Enterprises (SMEs). A fair share of governments in Africa have invested in innovations. For example, the African Union (AU) member states, through initiatives like the African Innovation Outlook, promotes cross-border collaboration and knowledge sharing among African countries to foster open innovation. According to the AU, 50% of innovation-related policies adopted since 2015 include elements of open innovation. Despite the progressive successes, open innovation in Africa faces challenges such as limited funding, inadequate infrastructure, regulatory constraints and promotional hurdles. A report by the Organization for Economic Co-operation and Development (OECD) (2023) notes that 35% of African startups cite difficulties in accessing international markets and intellectual property protection as significant barriers to open innovation. This study focusses on the strategic role of government in driving open innovation, taking cognizance that STPs size might be either an enhancing factor or a limiting factor to the effect.

1.2 Problem Statement

Open innovation debate recognizes that governments play a pivotal role in fostering innovation ecosystems within Science and Technology Parks (STPs). Globally, open innovation is said to serve as a catalyst for technological advancement and economic growth (Runiewicz-Wardyn & Eliashvili, 2022). Africa is documented to be making notable progress in technological innovations. However, despite increasing technological proficiency across Africa, rising from 25% to 41% in recent decades (Lee, 2001), understanding the strategic role of government in influencing open innovation within STPs remains limited. The size of STPs in Africa is reported to be heterogenous and each advancing innovation capacity at different rate(s). It is however not reported if and how STP size influence the impact of government interventions to drive open innovations. STPs in Africa aim to enhance collaboration among academia, industry, and

government (De Beer et al., 2020). However, the mechanisms through which government regulatory policies, funding mechanisms and promotional roles influence different size of STPs remain empirically, unknown and hence scarcely understood. Furthermore, the moderating effect of STP size on open innovation practices has not been comprehensively examined. This study addresses these gaps by investigating the strategic role of government in driving open innovation among STPs in Africa and the moderating role of STP size in the relationship between the strategic role of government (predictor) and open innovation (response variable). By analyzing key government interventions; regulatory policies, funding mechanisms and promotional roles, the research aims to provide actionable insights for policymakers, STP managers, and stakeholders. By addressing these critical gaps, the study contributes to the limited empirical evidence on open innovation in African STPs and provides guidance for fostering innovation ecosystems tailored to the region's unique needs and challenges.

1.3 Literature Review

1.3.1 Open Innovation Theory

Open innovation theory was formally introduced by Henry Chesbrough in 2003. Chesbrough argued that in a rapidly changing world, firms could no longer rely solely on their internal research and development (R&D). Instead, firms should open up their innovation processes to include external ideas and pathways to market. Open innovation theory has emerged as a significant framework in understanding how organizations can enhance their innovation capabilities by leveraging external knowledge and resources. Historically, firms followed a closed innovation model where R&D activities were conducted internally and innovation outcomes were closely guarded. Open innovation shifts this paradigm by encouraging firms to seek and integrate external knowledge, collaborate with external partners and leverage both inbound and outbound flows of technology (Chesbrough, Vanhaverbeke, & West, 2008). Open innovation theory offers a robust framework for understanding how external collaborations and knowledge flows can enhance innovation outcomes. In this framework, governments play a crucial strategic role in fostering open innovation. In the context of science and technology parks in Africa, leveraging open innovation can drive technological advancement and economic growth. Conversely, it is conceptualized in this study that government can drive open innovation but probably at the same time, the response to innovations among the STPs might be a function of the respective STP's size. STP size might either accelerate innovation or lag the rate of innovation. This theory supported the objective that analyzed the influence of strategic role of government: regulatory frameworks, financing mechanism and promotional role on open innovation among Science and Technology Parks in Africa.

1.4 Empirical Literature

The size of an STP could influences its capacity to leverage government support, engage in innovation activities and foster collaborations. Measures of an STP size include working spaces, number of tenants, employees' headcount and annual revenue. Working spaces within an STP are integral to fostering a conducive environment for innovation and collaboration. They provide the physical infrastructure necessary for startups, firms, research institutions, and other entities to

engage in creative and productive activities. Larger STPs with more tenants, adequate office units, availability of well-equipped offices, laboratory facilities, co-working spaces, conference and meeting rooms, incubation and acceleration spaces are better positioned to leverage government support and enhance their innovation capabilities through increased collaboration, diversity and resource availability. For example, a higher employee headcount correlates with increased innovation capacity, as more employees contribute to a broader range of skills, expertise and ideas (Colombo & Delmastro, 2002). For instance, STPs with large employee base, have been found to demonstrate high levels of innovative activity and output (Longhi, 1999). Larger STPs with more employees facilitate greater knowledge transfer and collaboration among tenant organizations (Phan et al., 2005) as is the case for Research Triangle Park in the USA that leverages its substantial employee base to drive significant collaborative research and innovation (Link & Scott, 2003). The size of an STP, measured by annual revenue, can accelerate the effectiveness of government policies aimed at promoting open innovation. Larger STPs with higher revenues may have more resources to implement and benefit from government financing initiatives, leading to greater innovation outputs.

Conversely, smaller STPs with lower revenues may struggle to leverage such government support effectively. Financially healthier STPs with higher revenues can invest more in innovation infrastructure, support services, and talent acquisition, leading to higher innovation outputs (Colombo & Delmastro, 2002; Link & Scott, 2003). High annual revenue ensures the sustainability and long-term growth of STPs, making them more attractive to innovative firms and researchers (Storey & Tether, 2002). Higher annual revenue allows STPs to better leverage government policies, enhance their innovation capabilities and sustain long-term growth. Understanding the impact of annual revenue can help in formulating targeted government policies to foster innovation in STPs across Africa. This literature advances that the impact of strategic role of government in driving open innovation is a function of the respective STP size.

1.5 Conceptual Framework of the Study

Strategic role of government among Science and Technology Parks (STPs) in Africa was conceptualized as the predictor for open innovation scales. On the other hand, STP size was hypothesized to moderate the relationship between the strategic role of government and open innovation scale(s).

Strategic Role of Government
ɸ *Policy and Regulation*
ɸ *Financing Mechanism*
ɸ *Promotional*

Science and Technology Park Size

Open Innovation Scale(s)

 Predictor Variable (TV)   **Moderating Variable (MV)**   *Target*

Figure 1: Conceptual Framework for Strategic Role of Government, STP Size and Open Innovations among STPs in Africa

1.6 General Objective

To analyze the moderating role of Science and Technology Park's size on the relationship between strategic role of government and open innovation among Science and Technology Parks in Africa.

1.7 Research Hypothesis

This study tested the hypothesis that H01: Science and Technology Park size does not have a statistically significant moderating role in the relationship between strategic role of government and open innovation among Science and Technology Parks in Africa.
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1.8 Research Gaps

Open innovation and specifically with regard to Science and Technology Parks has focused on the strategic role of government. However, no study has examined the moderating role of STP size on the relationship between strategic role of government (policy and regulation, financing mechanism and promotional role) and open innovation at Africa-wise context. The existing studies have evaluated the role of government using a country specific locus and using fragmented approach to the strategic role of government. This study takes a comprehensive approach to the strategic role of government and examines the moderating role of STP size on the relationship between strategic role of government and open innovation among STPs in Africa.

1.9 Significance of the Study

The study will provide insights among governments' policy makers, STP managers, innovators, and other stakeholders across Africa in crafting regulatory policies, financing mechanisms & promotional tools and in developing engagement models and collaborations with STPs. This study will provide statistical evidence on the influence of STP size on selected government -led drivers of open innovations among Science and Technology Parks in Africa.

2.0 Method

2.1 Philosophy, Design and Instrumentation and Data collection

This study used a theory testing research paradigm and cross-sectional descriptive research design. The unit of response was five senior officers from each of the Science and Technology Park/ Area of Innovation; manager/ director, chief executive, business development manager/chief manager, innovation and technology transfer officer, research and development coordinator and government liaison officer. The target population in this study consisted of the 14 Science and Technology Parks and Areas of Innovation in Africa, registered by International

Association of Science Parks (IASP) as at 30th March, 2024. A census approach was taken in this study.

This study relied on primary data, collected using a five-point ordinal scaled tool with the equivalences of agreement to 'no extent at all, to a small extent, to a moderate extent, to a high extent and to a very high extent (Charandrakandan, Venkatapirabu, Sekar, & Anandakumar, 2011). The study utilized the Statistical Package for Social Sciences (SPSS) version 26 and Python Libraries, (pandas, NumPy, matplotlib and seaborn) to extract the numerical test statistics. Linear Discriminant Analysis model was utilized to test the null hypothesis.

2.2 Internal Consistency and Validity and Principal Factor Analysis for Instrumentation

Stability of the instruments was tested using Cronbach Alpha Coefficient. The number of measures for each variable, Kaiser-Meyer-Olkin Coefficient, Chi- Square score, degrees of freedom (df), Rotations Sums of Squared Loadings (RSSL), number of components generated and the factor loadings range are presented in Table 1. The twenty-one measures used to examined strategic role of government generated a coefficient of 0.909, while the eight measures for open innovation generated a Cronbach coefficient of 0.942. In addition, the eight measures for Science and Technology (STP) size achieved a Cronbach alpha coefficient score of 0.994. The Table shows that the KMO Coefficients for all variables was above the threshold of 0.5 for acceptable level of construct validity, and all the Chi-Squares were statistically significant. The RSSL were all above 60% for the minimum acceptable loading. It is also observable that all the factor loadings were above 0.4 threshold for quality constructs. (Tabachnik & Fidell, 2014).

Table 1: Reliability, Construct Validity and Principal Factor Analysis

Variable	Number of Measures	KMO	Chi-Square	Df	p-value	RSSL (%)	Number of Components	Factor Loadings Range
Government Policy and Regulatory Framework	7	0.861	200.163	21	0.000	68.651	1	0.889 - 0.750
Government Financing Mechanism	7	0.863	183.976	21	0.000	66.760	1	0.903 - 0.696
Government Promotional Role	7	0.808	2606.001	21	0.000	82.610	2	0.914 - 0.677
STP Size	8	0.879	313.251	28	0.000	73.250	1	0.938 - 0.727
Open Innovation	8	0.831	395.583	28	0.000	72.855	1	0.958 - 0.684

2.3 Data Analysis and Presentation of Results

Both descriptive analysis (means and standard deviation), test of regression assumptions and linear discriminant analysis were carried out. Government policy and regulatory framework, financing mechanism, promotional role, STP size and open innovation generated a composite mean of 3.579, 3.537, 3.579, 3.561 and 3.687 respectively. These variables had associated standard deviations of 1.112, 0.127, 1.109, 1.109, 1.158 in that order. Hypothesis testing was done using linear discriminant Analysis (LDA) model and the equation in the form; $Df = \alpha_{+} Vz_1 + Vz_m INT + \varepsilon$

where Df was Open Innovation (OI), the target variable, **α** denotes the constant level of open innovation unaffected by the predictor variable, and moderating variable, **Vz** represents the discriminant coefficient for strategic role of government and **Vz_mINT** represents moderating variable's interaction term. This equation is supported by Montgomery, Peck, & Vining, 2001).

3.0 Results and Discussions

3.1 Response Rate

This study issued seventy (70) questionnaires, five to each STP and Areas of Innovations (AoI) in Africa. Out of the seventy questionnaires distributed, 44 of them were properly filled and returned, giving a response rate of 62.86%. The composition of the respective response rate by manager position was; managing director/director (13.64%), business development managers/chief managers (22.73%), innovations and technology transfers officers (22.73%), innovations and technology transfers officers (20.45%) and government liaison officers (20.45%) respectively. This response rate was deemed as adequate for this study, given the scope of interest (Charandrakandan, Venkatapirabu, Sekar & Anandakumar, 2011).

3.2 Test of Linear Discriminant Analysis Assumptions

Chatterjee & Simonoff (2013) advocate that prior to hypothesis testing for ratio-scaled data, it is crucial that statistical assumptions should be evaluated. Test of Gaussian Distribution, test of independence and test of linearity were carried out.

3.2.1 Test of Gaussian Distribution for Open Innovation

The data was subjected to the first LDA test of multivariate normality using Python Library (pandas, NumPy, matplotlib and seaborn) to extract the numerical test statistics. The Shapiro-Wilk statistics for numerical tests of normality are presented in Table 2.

Table 2: Gaussian Distribution Results for Study Variables

Measure	Shapiro-Wilk Statistic	Sig.
Open innovation	0.972764	3.774406e-01
Government Policy Regulatory Framework	0.957904	1.086410e-01
Government _Financing Mechanism	0.955629	8.927820e-01
Promotional Role of Government	0.962665	1.635967e-01
Science and Technology Park Size	0.971179	3.328854e-01

Table 2 shows that all the study variables had a Shapiro -Wilk tests statistics > of 0.955 and a p-value of greater than 0.1> 0.05 for a normally distributed data. These results implied that a linear discriminant analysis (LDA) model was suitable for testing the null hypothesis (Garson, 2012; Shapiro & Wilk, 1965).

3.2.2 Test of Collinearity of Study Variables

The next test of LDA assumption done was the test of collinearity between and among the study regressors. The outcome is presented in Table 3. The result point that the Variance Inflation Factors (VIF) of the study variables ranged from a low 2.580066 for government policy and regulatory role and a high of 7.402423 for the science park size (moderating variable). These VIFs were < VIF of 10.00. This implies that the multicollinearity levels of the study variables did not pose any serious threat to the accuracy and interpretation of the study findings Chatterjee & Simonoff ,2013).

Table 3: Variance Inflation Factors for Study Variables

Variable	VIF Coefficient
Government Policy and Regulatory role	2.580066
Government Financing Mechanism	3.645953
Government Promotional Role	4.593378
STP_Size	7.402423

3.2.2 Test of Autocorrelation for Study Variables

This test was carried out using Durbin-Watson d statistic. The extracted Durbin-Watson d statistics are presented in Table 4. The statistics of the respective study variables ranged between 1.804 (government financing mechanism and 1.997 for the Science Park Size). These statistics are all within the statistic range of 1.5 and 2.5 for no autocorrelation observations (Garson, 2012). Based on these statistics, the assumption of absence of autocorrelation in the parameters measuring the study variables was achieved (Argyrous, 2011).

Table 4. Test of Absence of Autocorrelation Output

Variable	Durbin-Watson (d)Statistic
Government Policy and Regulatory Role	1.880
Government Financing Mechanism	1.804
Government Promotional Role	1.985
STP- Size	1.997

3.3 Inferential Results

To identify unique categories of open innovations, the scores of the respondents from eleven STPs were weighted. The weighted scores were grouped into three with the thresholds [IF (Q34<=2.7879,"Low", IF(Q34<=3.8939,"Medium","High")). Based on this formulae, three categories of open innovations were created.

The initial step involved centering of data. This process generated the standardized scores (Z-scores for the weighted measure for strategic role of government) and the Z-scores for Science and Technology Park (STPs) Size. A new variable was then generated and named "interaction term", which was computed as; Z-Scores for weighted strategic role of government * Z- scores of the STP_Size. Following this process, the moderated model outputs was achieved through subjecting the ZStrategic role of government scores and the interaction to a Linear Discriminant Model (LDA) with open innovation. After this, Linear Discriminant Analysis (LDA) was applied to test the null hypothesis. The group statistics, for the respective Open Innovation (OI) categories and the test of equality of means of INT, strategic role of government are presented in Table 5.

Table 5: Group Statistics and Test of Equality of Means- INT, ZStrategic Role of Government

Group Statistics					
Open Innovation		**Mean**	**Std. Dev.**	**Valid N (listwise) Unweighted**	**Weighted**
1	INT	-.69411	.690009	5	5.000
	ZStrategic Role of Government	-.78122	.467579	5	5.000
2	INT	.01147	.006494	2	2.000
	ZStrategic Role of Government	.02493	.117831	2	2.000
3	INT	1.71334	.835217	3	3.000
	ZStrategic Role of Government	1.28541	.225804	3	3.000
Total	INT	.86335	.885795	10	10.000
	ZStrategic_Role_of_ Government	.00000	1.00000	10	10.000

Tests of Equality of Group Means					
	Wilks' Lambda	F	df1	df2	Sig.
INT	0.467	3.990	2	7	0.070
ZStrategic Role of Government	0.110	28.306	2	7	0.000

The results in Table 5 reflect that the group statistics for the INT and Zstrategic role of government across the three different classifiers of scale of open innovation. The Table shows that in all the categories of open innovation, ZStrategic role of government achieved a well differentiated scores of means and standard deviations. The Table shows that Wilk's Lambda (Λ) for INT was 0.467, F-statistic of 3.990 (p=0.070. On the other hand, a Wilks' (Λ) of 0.110 for ZStrategic role of government, associated F-Statistic of 28.306 (p=.000). The coefficient for INT was not statistically significant with p-value>.05 but the one for Zstrategic role of government was statistically significant (p-value < 0.05). INT's associated Wilk's Lambda was higher (close to 0.5), compared to a Wilk's Lambda of 0.110 the case of Zstrategic role of government. This means that INT has a weaker discriminant power in the LDA model. On the other hand, the Zstrategic role of Government's Wilk's Lambda was closer to zero [($\rightarrow 0$)] and hence implying that it had a relatively stronger discriminant power in the LDA model. Based on this insight, the associated summary of Canonical Discriminant Function coefficients for the two predictors were generated and the results are presented in Table 6.

Table 6: Summary of Canonical Discriminant Functions- INT, Zstrategic Role of Government

Eigenvalues				
Test of Functions	Eigenvalue	% of Variance	Cumulative %	Canonical Correlation
1	12.565[a]	96.7	96.7	0.962
2	.433[a]	3.3	100.0	0.549

a. First 2 canonical discriminant functions were used in the analysis.

Wilks' Lambda				
Test of Function(s)	Wilks' Lambda	Chi-square	df	Sig.
1 through 2	0.051	19.285	4	0.001
2	0.698	2.336	1	0.126

	Structure Matrix		Canonical Disc.Function Coeff.		Functions at Group Centroids*					
	Function		Function		Open innovation Function_1			Open innovation Function_2		
	1	2	1	2	1	2	3	1	2	3
Zstrategic Role of Government	0.794*	-0.607	2.812	-.700	-2.360	-.751	4.434	.333	-1.092	.172
INT	0.242	.970*	.964	1.261						
(Constant)			-.833	-1.089						

The results in Table 6 shows that the first function /predictor had an Eigenvalue of 12.565[a] and an associated canonical correlation of 0.962, meaning that this discriminant function had high discriminant power in the different categories on open innovation. It also implies that the predictor explained a higher proportion of variance between the three groups of open innovation. This Eigenvalue implies that the function contributed a ratio of 12.565 to the between groups sums of squares to the within-group sum of squares and the overall classification accuracy of the Linear Discriminate Model of this predictor and open innovation. The Table further shows that Wilk Lambda associated with the first LDA function was 0.051 with and related p-value of 0.001. This means that approximately 5.1% of the variations in the opening innovation categories (category one, category two and category three) is not explained by this function among Science and Technology Parks (STPs) in Africa. These results mean that the LDA model can explain approximately 94.9% of the variations in the different categories of open innovation. The second function [associated with INT] was had a Chi-Square of 2.335 and p-value of 0.126, hence not statistically significant. Based on these results, the study *fails to reject the null hypothesis that Science and Technology Park size does not have a statistically significant moderating role in the*

relationship between strategic role of government and open innovation among Science and Technology Parks in Africa. This implies that only the first function is relevant in the classification of open innovation among STPs in Africa.

The Table further show that the structure matrix/ structure coefficient loadings associated with the first and the second function. The highest correlations were 0.794* and 0.970* for the respective functions, an indication of the weight contribution in the discriminant model of open innovations among the three categories of STPs/open innovation. Similarly, the Table shows the canonical discriminant function coefficients. These coefficients indicate the contribution of Z strategic role of government in the LDA function was +2.812, INT (0.964) and a constant of -0.833. The coefficient 2.812 is positive (+ve) meaning that it contributed towards the separation of the three categories of open innovation/STPs. The Table also shows that the functions at group centroids for the three categories of open innovation/ STPs. In the case of the open innovation function_1; The mean associated with STPs with "category three" innovations was 4.434, followed by -.751 for those with "category two" level innovations and finally by a mean of -2.360 for the "category one" level of open innovation. These centroids shows that the classification (centers) in each discriminant feature space among the three categories of open innovation were well differentiated as reported in the centroids and they do not overlap at all.

This study used a five-point Likert scale and the weighted scores used in the LDA model. The centroids indicate that low coefficients of the weighted responses for Zstrategic role of government favored the first category and the second category of open innovations. On the other hand, high weighted scores of Z_strategic role of government had higher likelihood for category three classification. The same trend was dissimilar with the second function. These results show that higher intensity for strategic role of government is associated with higher level of reported open innovation among STPs in Africa. These statistics imply that the linear discriminant model for strategic role of government and open innovations among STPs in Africa is.

Open_Innovation= -.833+ 2.812Z_Strategic Role of Government …………….Model 1
In order to evaluate the performance of the LDA function for the centered strategic role of government, this study generated both the confusion Table and the 'Jack-Knife'/ cross validated classification Table. The results are presented in Table 7.

Table 7: Confusion Matrix and Jack-Knife Classification Table for INT, Strategic Role of Government

Classification Results[a,c]

		Open_Innovation	Predicted Group Membership			Total
			1	2	3	
Original	Count	1	4	1	0	5
		2	0	2	0	2
		3	0	0	3	3
	%	1	80.0	20.0	.0	100.0
		2	.0	100.0	.0	100.0
		3	.0	.0	100.0	100.0
Cross-validated[b]	Count	1	4	1	0	5
		2	0	2	0	2
		3	0	0	3	3
	%	1	80.0	20.0	.0	100.0
		2	.0	100.0	.0	100.0
		3	.0	.0	100.0	100.0

a. 90.0% of original grouped cases correctly classified.
b. Cross validation is done only for those cases in the analysis. In cross validation, each case is classified by the functions derived from all cases other than that case.
c. 90.0% of cross-validated grouped cases correctly classified.

The Table shows that 80.0% of the cross validated cases in category one level of Open_ Innovation grouped cases were correctly classified (no change from the baseline LDA model) , 100.0% were correctly classified in category scale two of open innovation (no change from the baseline LDA model) and 100% were correctly classified in scale three of open innovation (no change from baseline model). Overall, prediction shows that the cross validated output achieved a hit ratio of 90.0% (no change from baseline LDA model) correct classification. Based on these results, the hit ratio of 90.0% for the moderated model (between INT and ZStrategic Role of Government) did not change neither in respective categories nor in the overall hit ratio.

These findings are in line with empirical studies that emphasize the primacy of institutional and policy frameworks over structural characteristics like size in shaping innovation outcomes. Etzkowitz and Zhou (2018) highlight that the effectiveness of STPs is often more contingent on innovation networks and policy support than on park size. Ben Slimane et al. (2018) also found that network dynamics and quality of collaboration had greater influence on innovation performance in STPs than the size or age of the park. These findings align with the findings of Murati-Leka, & Fetai (2022) who found out that company size had no influence on the ability to leverage government support for innovation further implying that an organization's size does not significantly moderate government support and innovation performance measures. On the other hand, these finding vary from the findings of Schiavone, Villasalero & Simoni (2014) who suggested that larger parks depicted stronger performance as indicated by enhanced networking

opportunities, more tenants and higher employment thereby indicating a size-driven moderating effect.

4.0 Conclusions and Recommendations

4.1 Conclusions

The test of equality of group means and summary of canonical discriminant functions for INT (interaction term) had a Wilk's Lambdas (Λ) of $0.467 \approx 0.5$, Chi- Square of 3.990 and a p-value of .07 at 5% level of significance. The associated canonical correlation for this INT was 0.549. Based on these statistics, this study fails to reject the null hypothesis that Science and Technology Park size does not have a statistically significant moderating role in the relationship between strategic role of government and open innovation among Science and Technology Parks in Africa. This study hence confirms that the impact of the strategic role of government in driving open innovation is statistically not influenced by STP size.

4.2 Recommendations

Strategic role of government is key in driving open innovations among STPs in Africa. However, STP size does not have a statistical significance role either in enhancing the government impact or limiting the same in driving open innovation. As such, government policy and regulatory framework, financing mechanism and promotional role should rather be uniform irrespective of the respective STP size in the Country. In order to enhance innovations, stakeholders should not regard STP size as a bottleneck towards engagement with STPs and AoI. They should be regarded as equal partners in the innovation ecosystems.

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