GREEN INNOVATION STRATEGY AS ANTECEDENT OF PERFORMANCE SUSTAINABILITY AMONG ISO 14001 CERTIFIED MANUFACTURING FIRMS IN KENYA: DOES COMPETITIVE ADVANTAGE PLAY A MEDIATING ROLE?

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Abstract

The quest for performance sustainability among manufacturing firms have been on rise. This has been prompted by decline in performance among manufacturing firms which has been escalated by increased environmental degradation and unmanaged waste. The paradox on whether attaining ISO 14001 certification among manufacturing firms has improved performance sustainability of firms is still unresolved in Kenya. This study sought to investigate whether competitive advantage had a mediating effect on the relationship between green innovation strategy and performance sustainability in ISO 14001 certified manufacturing firms in Kenya. The study was guided by triple bottom line theory, green business model innovation and resource-based view theory. The positivism philosophy was adopted in the study where descriptive and explanatory research design was utilized. Census of 60 ISO 14001 certified manufacturing firms were involved in the study which involved 218 respondents drawn from the heads of finance, ICT, operations, marketing and HR departments. Semi structured questionnaires were used to collect data which was analysed using regression model. The results indicated that competitive advantage had partial mediating effect on the relationship between green innovation strategy and performance sustainability of ISO 14001 certified manufacturing firms in Kenya. It was recommended to the management to ensure they automate most of their processes, ensure there is green department and train their employees to ensure they utilize their tacit knowledge to address issues of sustainability in their firms. To government, it should come up with flexible regulatory framework to guide firms going green.

Keywords: Green Innovation Strategy, Performance Sustainability, Competitive Advantage, ISO 14001 Certified Manufacturing Firms

1.0 Introduction

Manufacturing entails transforming input (in order to add value in the inputs) in to finished products and services that can be sold to the market (Levinson, 2018). There have been quest for shift from the traditional manufacturing to sustainable manufacturing which is in line with goal number 9 of sustainable development goals agenda 2030 (Gholami, Rezaei, Saman, Sharif & Zakuan, 2016). This traces its roots to 1972's Stockholm conference by UN relating to human environment which was further advanced after 'Rio de Janeiro Earth summit' of 1992 (UN, 1993). The push for sustainable manufacturing has prompted move towards green circular economy and green innovation whose major trigger is climatic changes, increased environmental degradation emanating

from escalating resource utilization and unmanaged waste and emissions (De Giovanni & Zaccour, 2019; Borowski, 2020).

The world is transitioning to green economy with Denmark being on the lead. Danish International Development Agency (DANIDA) has supported green growth and climate change mitigation with its development partners (DANIDA, 2011, UN, 2017). The level of uptake of sustainable manufacturing is noted to be low in Sub-Saharan African due to inadequate finance, increased geopolitical tension and protectionism (KNBS, 2020). Adoption of green innovation is popularized as the game changer to green economy and sustainable manufacturing (Hernandez-Vivanco, Bernardo, & Cruz-Cázares, 2018). Green innovation relates to eco-technologies, green technologies, eco-innovation and environmental innovation (Schiederig, Tietze & Herstatt, 2012; Calza, Parmentola & Tutore, 2017). Green innovation involves coming up with processes and products which embraces technology involving saving energy, recycling and minimizing waste, mitigating pollution and utilizing green product designs and promoting environmental management (Chen, Lai and Wen, 2006).

Tariq, Badir, Tariq and Bhutta (2017) acknowledges that green innovation creates value to stakeholders when they intertwine environmental, social and economic aspects of performance of a firm which form basis for performance sustainability of firms. Gholami, et al. (2016) proposes that economic, societal and environmental aspects ought to be considered in the entire product life cycle that is before and during manufacturing, product use and after use of the product. The sustainable manufacturing can yield success when adverse ecological burden is mitigated, there is improved efficiency in utilization of energy and materials, reduced waste and emission, provides quality health of employees and have cost benefit (Jawahir, Badurdeen & Rouch, 2014). Elkington (1994) while coining Triple Bottom Line (TBL) approach noted that sustainability success is tenable when the three bottom lines of firm famously referred as 3Ps is achieved. The 3Ps refer to the first P - Profit referring to financial or economic performance of firm, the second P refer to people or what we refer to as social performance of the firm and lastly third P refer to planet which refer to the environmental performance of the firm. It is noted that attaining profitability cannot account to full cost of doing business but ought to consider social performance which encompasses the safety, health and satisfaction of employees, customers and stakeholders. The other aspects are environmental which addresses aspects like reduced ecological pollutions, foot print, waste, emissions, environmental accidents and increased energy and material utilization efficiency (Huanga & Badurdeen, 2017; Kraaijenbrink, 2019; Kenton 2020).

Performance sustainability can be an uphill task to achieve in dynamic business environment if a firm doesn't exhibit unique attributes and resources which outperform their competitors (Singh, Murty, Gupta, & Dikshit, 2012). Firms attain competitive advantage when they tame the interests of consumers to buy their products unlike those of their competitors and come up with superior products which consider both price and non-price qualities, cannot be duplicated and are unique, valuable and non-transferable and are properly matched with firm's strategy in a distinct way (Barney, 1991; Ambatha & Momaya, 2004; OECD, 2009; Christensen, 2010; Calza, et al., 2017). Porter (1985) categorize strategies for attaining competitive advantage in to three namely: cost leadership, differentiation and focus. Cost leadership involves coming with unique products at relatively lower price than competitors which involves reduction of production and promotion cost, research development and control overhead cost in order to lower price of products resulting from efficiency in production and economics of scale (Atikiya, Mukulu, Kihoro & Waiganjo, 2015;

Kimiti, Muathe & Murigi, 2020). Differentiation on the other hand involves offering unique products while obtaining price premium that exceeds cost of differentiation (Fogel, 2017). To attain competitive advantage, differentiation need to adopted in the entire product life cycle which may involve utilizing unique tacit knowledge (Marin et al., 2015), efficiency in utilizing internal capacities through automations and building synergy for greening (Rao & Krishna, 2003; Salim, Ab Rahman, & AbdWahab, 2019).

Firms in quest for sustainable manufacturing and greening their operations have relentlessly moved towards achieving ISO 14001 certifications which is related to Environment Management System (EMS) (Testa & Irlado, 2010). Kenya has small percentage of firms which have achieved ISO 14001 certification although the trend is worrying worldwide with only 8 percent of firms achieving ISO 14001 certification world wide by 2014 (KAM, 2019). The rush to achieving ISO 14001 certification by Kenyan firms isn't commensurate with performance sustainability of firms (Zaramdini, 2007; Anyango & Wanjau, 2012). It is anticipated that when firms attain ISO 14001 certification, they are associated with improved performance yet despite clear policy frameworks there is evident challenges on firms managing their waste and extrapolation of ecological crisis raising concern whether achieving ISO 14001 certification and going green is linked to performance sustainability of firms. Thus, the objective of this paper was to explore whether competitive advantage has mediating effect on the relationship between green innovation strategy and performance sustainability of ISO 14001 certified manufacturing firms in Kenya.

1.2 Statement of the Problem

Kenya has focused on manufacturing as one of the key pillars of economic growth and development. For Kenyan economic growth to grow to double digit, sustainable manufacturing is noted to be critical (KAM, 2019). It is however noted that the sector has been inconsistent and dwindled for the last 10 years and has lagged behind other sector on their contribution to GDP (KNBS, 2019). Most firms have failed to meet their profitability targets with those operating abroad losing their market share (Wangui, 2019). Most firms (54%) have not operated optimally with only 11% achieving full automation (KNBS, 2019). There are sustainability challenges among manufacturing firms despite adoption of ISO 14001 certification by many firms and governing instituting clear regulatory framework to govern the manufacturing sector.

There are notable conceptual gaps by varied studies on green innovation strategy. For instance, Ma, Hou and Xin (2017) conceptualize green innovation strategy using green process innovation while Buswari, Setiawan, Sumiati and Khusniyah (2021) viewed green innovation strategy using green product and marketing innovation strategies. The hitherto study findings are inconclusive on whether the relation between green innovation strategy and performance sustainability can be moderated by competitive advantage. For instance, study by Nuryakin & Maryati (2022) indicated that competitive advantage fully mediated the relation while Anwar (2018) noted that competitive advantage had partial mediation. Study by Setyawati, Rosiana and Shariff (2017) indicated that competitive advantage had no mediating effect on the relationship between green innovation strategy and performance sustainability of firms. It was further noted that there were methodological gaps for instance study by Nuryakin & Maryati (2022) utilized purposive sampling which was non-representative and biased while Anwar (2018) used an exploratory study which limits hypothesis testing and generalization of findings. Thus, this paper tried to open a black box on whether competitive advantage mediated the relationship between green innovation strategy and performance sustainability among the ISO 14001 certified manufacturing firms in Kenya.

1.3 Specific Objectives

To investigate the mediating role of competitive advantage on the effect of green innovation strategy on performance sustainability among ISO 14001 certified manufacturing firms in Kenya.

1.4 Research Hypotheses

Ho: *Competitive advantage does not mediate the effect of green innovation strategy on performance sustainability among ISO 14001 certified manufacturing firms in Kenya.*

Ha: *Competitive advantage mediates the effect of green innovation strategy on performance sustainability among ISO 14001 certified manufacturing firms in Kenya.*

2.0 Theoretical Review Literature

2.1 Triple Bottom Line Theory

The theory was advanced by Elkington (1994). The main preposition of the theory was that firms operate sustainability if they are in position to address both economic, social and environmental concerns. The theory opined that firms should endeavor to attain what is operationalized as three bottom lines popularized as 3Ps that is profit, people and planet. The P for profit represents economic or financial performance of firm while P for people stood for social performance of the firm. The third P represented planet which stood for environmental performance of the firm (Gholami, et al., 2016; Kraaijenbrink, 2019). The theory asserts that for sustainability to be realized there is need to consider both financial and non-financial aspects of performance. The theory further acknowledges that when interest of stakeholders and employees are served as firm serves its interests (profitability) and in extension address environmental concerns like environmental degradation and global warming. Kenton (2020) noted that environmental concerns can be realized through waste reduction, efficient use of natural resources and utilization of renewable energy.

2.2 Green Business Model Innovation

The proponent of the model was Bisgaard, Henriksen and Bjerre (2012). The model is built on postulation that when initiating a novice model of sustainability, it is imperative to put in to consideration the role played by innovation in coming up with new product and in modifying the business model. It provides clarity on how to green business practices and to what level a firm may qualify to be green. The shifts made by firm's operations are the green business model innovations where innovation may prompt firms to substitute to greener inputs, reusing, recycling resources to make greener products and processes. The shifts in the firm ought to prompt the existing operation models to create new strategic alternatives which consider its customers, its processes and financial viability. It should lead to modification, re-designing alternatives and creating value as the firms adopt green business model (Osterwalder & Pigneur, 2010). Although Blackman et al. (2010) indicated that going green has its backstops like lack of knowledge and large cost linked to greening, it is credited with generating processes and products which are ecologically friendly efficiency in use of raw materials, energy and water while reducing waste and GHG emissions (Bisgaard et al., 2012). The model calls for clear policy guidelines and regulations which are flexible in nature as firm green and building networks and partnership as firm go green (FORA, 2009; OECD, 2012).

2.3 Resource Based View

This theory was advanced Penrose (1959) and later improved by Barney in 1991. The key tenets of the theory expound how paramount the organization's resources and capabilities are in helping firms achieve competitive advantage and superior performance compared to their competitors.

Resources are viewed as stock owned by a firm which are implicit, not simple socially and which can be grown or multiplied (Barney, 1991; Peteraf, 1993; Black & Boal, 2007) while capabilities are processes which utilize resources to offer value strategic intent (Morgan, Katsikeas & Vorhies 2012). Resources are viewed as vital in realizing firm capabilities while capabilities utilize resources to meet firms targets (Barney, 1991). Firms need to combine their varied resources and restructure existing capabilities and initiate new capabilities (Eisenhardt & Martin, 2000). When firm holds unique resources and distinctive capabilities, they strategically adjust to fit to their external variation thus successful application of the strategy (Slotegraaf, Moorman, & Inman, 2003). There is need for alignment between strategy and external environment (Venkatraman & Prescott, 1990). Likewise, green innovation strategy needs to be well aligned with ecological and market pressure and regulatory frameworks in place to remain relevant. To address volatility of market, there is need to reconfigure resources in order to maintain competitiveness as advocated by Teece, Pisano and Shuen (1997).

3.0 Empirical Review

Nuryakin & Maryati (2022) conducted a study on effect of Green Marketing Orientation (GMO) on green marketing performance and whether green innovation and competitive advantage mediated the relationship among Batik SMEs in Yogyakarta, Indonesia. The study utilized quantitative research approach. Purposive sampling was used to sample 223 Batik SMEs in Yogyakarta, Indonesia. Questionnaires were used to collect data which were analysed using Structural Equation Modelling (SEM). It was found that green marketing orientation significantly affected green innovation and competitive advantage which had impact on green marketing performance. It was found that competitive advantage had mediating effect on the relationship between GMO and green marketing performance. The study was limited in terms of methodology as it utilized only quantitative methodology and use of purposive sampling method which is non-representative and prone to biasness.

Buswari, Setiawan, Sumiati and Khusniyah (2021) conducted a study on the effect of green product innovation and green marketing on competitive advantage and business performance in 3 cities of Surabaya, Kota Batu and Kota Kediri in Indonesia. The study was anchored on resource-based view theory. The study employed an explanatory research design. The sample size was 95 businesses operating as SMEs. The data was collected using questionnaires assisted by PLUT East Java. Data was analysed using Partial Least Square (PLS) approach. The study finding indicated that that green marketing and green product innovation have a significant effect business performance. Competitive advantage mediated the relationship between green marketing and green product innovation on business performance among SMEs in Indonesia. The study had methodological gaps as the study utilized only quantitative research methods while ignoring inputs that may be offered through combining both quantitative and qualitative research methods.

Wirda, Herri, Elfindri, Rivai, and Herizon. (2019) conducted a study on entrepreneurial competency and business performance with competitive advantage playing mediation role in creative industries in West Sumatera-Indonesia. Competitive advantage was operationalized in terms of lower costs, product quality, managerial abilities, growth the company and company image. Through Structural Equation Modeling (SEM) analysis, it was found that entrepreneurial competency had positive effect business performance while competitive advantage mediated the relationship. The sample size was small; only 2.82% of entire target population thus limiting generalization of results. Contextually, there was a gap as the study was done in creative industries in Indonesia thus limiting generalization.

Pratono, Darmasetiawan, Yudiarso and Jeong (2019) conducted a survey on green entrepreneurial and market orientation can aid in attaining sustainable competitive advantage and determine the role played by inter-organizational learning among 280 manufacturing firms in Indonesia. The results of the inquiry indicated that green entrepreneurial and market orientation influenced performance of firms while inter-organizational learning was linked to competitive advantage. The study was limited in its context as it was done in Indonesian manufacturing industry without specifying various sectors.

Anwar (2018) conducted an exploratory study on how SMEs performance was influenced by Business Model Innovation (BMI) when mediated by competitive advantage among 303 manufacturing SMEs in Pakistan. Questionnaire was used to collect data. SEM was used to analyse data. It was found that BMI influenced performance of SMEs in Pakistan while competitive advantage partially mediated the relationship. The study had outstanding gaps which include: the study was exploratory which limits hypothesis testing and generalization of findings. Secondly the study was done in different context that is it involved SMEs and was done in Pakistan thus limiting generalization of the results.

Setyawati, Rosiana and Shariff (2017) conducted a study on how performance was influenced by innovation when mediated by competitive advantage in 125 SMES in Purwokerto province in Indonesia. SEM was used to analyse data. It was found that innovation affected performance of SMEs while competitive advantage did not mediate the relationship. The study was limiyed in that limitation findings from SMEs and in one province cannot be generalized in all areas and in all sectors of manufacturing.

4.0 Conceptual Framework
Drawing from the insights obtained from the review of literature, figure 1 provides a schematic diagram of the relationship that required validation in the context of ISO 14001 Certified Manufacturing Firms
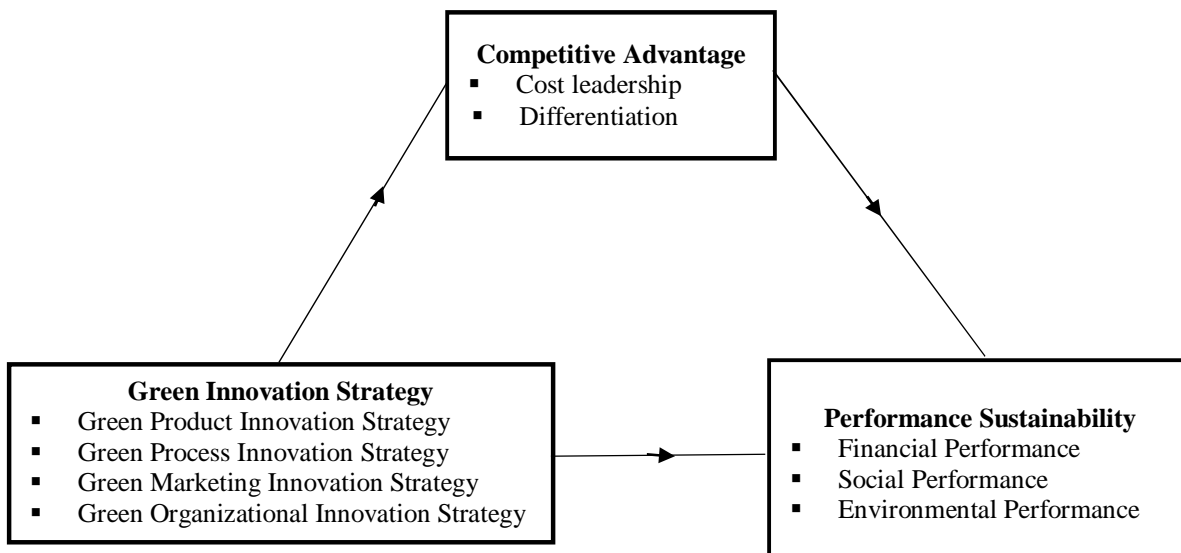

Figure 1: Conceptual Framework
Source: Author (2022)

5.0 Research Methodology

The study utilized positivism philosophy. The philosophy assumed that the research was not influenced by the researcher and the findings were not biased as noted by Saunders, Lewis and Thornhill (2019). Descriptive and explanatory research design were adopted during the study. The research design adopted has been applied in previous surveys in the social sciences (Kinyua, 2015; Kinyua, Muathe & Kilika, 2015; Gabow & Kinyua, 2018; Muthoni & Kinyua, 2020). The inquiry was conducted among ISO 14001 certified manufacturing firms in Kenya. Census was done for all 60 ISO 14001 certified manufacturing firms which were certified before December 2019. The respondents targeted were 300 informants who headed finance, human resource, marketing, ICT and operations departments in the sampled firms. The data was collected using semi-structured questionnaires using mail survey and drop and pick methods.

Pilot study was conducted involving 3 ISO 14001 certified firms to determine validity and reliability of the instruments. Validity of the instrument was analysed using face, content and construct validity. To determine reliability of the instruments, Cronbach's Alpha coefficient was used. The threshold for the coefficient was set as 0.7 as advocated by Tavakol and Dennick (2011). The findings were summarized in table 1.

Table 1: Cronbach's Alpha Values

Variable	Cronbach's alpha	No. of item	Comment
Green innovation strategy	0.818	52	Reliable
Competitive advantage	0.822	15	Reliable
Performance sustainability	0.821	28	Reliable
Overall Reliability Coefficient	**0.820**	**95**	**Reliable**

Source: Pilot Data (2020)

The findings show that the overall Cronbach's Alpha Coefficient of all variables was 0.820 for all 95 items of the three variables. This coefficient was greater than the set threshold of 0.7 thus it was concluded that all variables were reliable. The data was analysed using descriptive and inferential statistics. Descriptive statistics was summarized in form of mean and standard deviation. Inferential statistics was used to test hypothesis where regression analysis model was used.

6.0 Findings and Discussions

This study involved 300 respondents. Out of the mapped 300 respondents, 218 filled and returned questionnaires while 72 questionnaires were not returned. This represented 72% which was above 50% and adequate for making inferences and drawing conclusions as proposed by Mugenda and Mugenda (2003).

6.1 Descriptive Statistics

To offer insights on the characteristics of the variable under investigations, the study presented descriptive statistics using mean and standard deviation. The study analysed responses of each of the 218 responses for the four aspects of green innovation under investigation. The findings of the descriptive analysis were illustrated in table 2

Table 2: Descriptive Statistics of Green Innovation Strategy

Variable	Mean	Standard deviation
Green product innovation strategy	4.04	0.552
Green process innovation strategy	4.01	0.549
Green marketing innovation strategy	3.94	0.644
Green organizational innovation strategy	3.98	0.613
Aggregate score	**3.99**	**0.590**

Source: Survey Data (2022)

The results in table 2 indicated that the aggregate mean for green innovation strategy was 3.99 with variance of responses being 0.590 as indicated by the standard deviation. This mean tends towards 4.0 (Agree) on a 5point Likert scale which implied that all aspects of green innovation strategy had been adopted among the ISO 14001 certified firms. The low standard deviation implied that there was low variability among the responses given by respondents on whether aspects of green innovation strategies had been adopted by ISO 14001 certified manufacturing firms. The study further analyzed responses of respondents relating to competitive advantage which was the mediating variable in this study. The descriptive statistics of competitive advantage were presented in table 3.

Table 3: Descriptive Statistics of Competitive Advantage

Variable	Mean	Standard deviation
Cost leadership	3.93	0.725
Differentiation	3.91	0.788
Aggregate score	**3.92**	**0.757**

Source: Survey Data (2022)

The findings in table 3 illustrated that the average score of competitive advantage was 3.92 while the standard deviation was 0.757. The mean was close to 4 which is agree as per the 5point Likert scale which meant that firms had adopted competitive advantage which enhanced performance sustainability of ISO 14001 certified manufacturing firms. The standard deviation was 0.757 which indicated that there was low variability of responses. The results further indicated that the firm had adopted cost leadership and differentiation among the ISO 14001 certified manufacturing firms. The study further analysed responses relating to performance sustainability. The descriptive statistics on performance sustainability were presented in table 4.

Table 4: Descriptive Statistics of Performance Sustainability

Variable	Mean	Standard deviation
Financial performance	3.94	0.870
Social performance	3.94	0.821
Environmental performance	3.91	0.833
Aggregate mean for performance sustainability	**3.93**	**0.841**

Source: Survey Data (2022)

The study findings in table 4 indicated that the average score for performance sustainability was 3.93. The corresponding standard deviation was 0.841. The mean tended to 4 (agree) in a 5point Likert scale while the standard deviation shown the variability of responses was low connoting that most ISO 14001 certified manufacturing firms were performing sustainably. The results further

indicated that ISO 14001 certified manufacturing performed financially, socially and environmentally.

6.2 Inferential Statistics

Path analysis involving four steps was used to determine whether competitive advantage had mediating effects on the relationship between green innovation strategy and performance sustainability of ISO 14001 certified manufacturing firms as recommended by Baron and Kenny (1986). The analysis was based on adjusted coefficient of determination (R^2), F statistics (ANOVA), unstandardized coefficients (beta values) and p values at 0.05 level of significance. The first step involved regressing green innovation strategy on performance sustainability as indicated in table 5.

Table 5: Regression Results for Green Innovation Strategy on Performance Sustainability

Model summary				
Model	**R**	**R square**	**Adjusted R^2**	**Standard error of estimate**
1	.481[a]	.231	.226	.22623

ANOVA					
Model	**Sum of squares**	**df**	**Mean square**	**F**	**Sig.**
Regression	2.199	1	2.199	52.357	0.000b
Residual	9.566	226	.042		
Total	11.765	227			

a. Predictors: (Constant), Green innovation strategy
b. Dependent variable: Performance sustainability

Model	Unstandardized coefficients		Standardized coefficient (beta)	t	Sig.
	Beta	**Std error**			
Constant	2.807	.571		4.917	0.000
Green innovation strategy	.281	.143	.130	1.970	0.050

Dependent variable: Performance sustainability

Source: Survey Data (2022)

Findings in table 5 shown that the adjusted R squared was 0.226 meaning green innovation strategy explains 22.6% of the variation of performance sustainability at 95% level of significance in ISO 14001 certified manufacturing firms. It was realized that the regression model was statistically significant at F (1, 226) = 52.357 and the calculated probability is 0.000 meaning the regression model fitted the data well. Since the calculated probability value was below the acceptable level of 0.05, it can be concluded that the data is ideal for making inferences and conclusions. The summary for model 1 was:

Performance Sustainability = 2.807 + 0.281Green Innovation Strategy …………………..…..…Model 1

The estimated regression model clearly indicated that green innovation strategy was statistically significant at β=0.281; t = 1.970; p = 0.050. This implies that that there is a relationship to be mediated. It means that if green innovation strategy remains constant at zero, performance sustainability would be 2.807. A unit change in green innovation would affect performance sustainability by 0.281. The second step involved regressing green innovation strategy on competitive advantage as indicated in table 6.

Table 6: Regression Results for Green Innovation Strategy and Competitive Advantage

			Model summary				
Model	**R**		**R square**	**Adjusted R^2**	**Standard error of estimate**		
1	.375^a		.141	.136	.26990		

				ANOVA			
Model	**Sum of squares**		**df**	**Mean square**	**F**		**Sig.**
Regression	2.035		1	2.035	31.797		0.000b
Residual	14.464		226	.064			
Total	16.499		227				

a. Predictors: (Constant), Green innovation strategy
b. Dependent Variable: Competitive advantage

Model	**Unstandardized coefficients**		**Standardized coefficient (beta)**	**t**	**Sig.**
	Beta	**Std error**			
Constant	3.462	.681		5.082	0.000
Green innovation strategy	.119	.170	.046	.677	0.000

Dependent Variable: Competitive advantage

Source: Survey Data (2022)

Results from table 6 shows that the adjusted coefficient of determination was 0.136 translating to 13.6% of changes in competitive advantage being explained by green innovation strategy at 95% level of significance among ISO certified manufacturing firms. The estimated regression model was found to be statistically significant as revealed by F statistics $(1, 226) = 31.797$ at a calculated probability of 0.000 which is below threshold of 0.05. The summary for model 2 was:

Competitive Advantage = 3.462 + 0.119 Green Innovation Strategy……..…………. Model 2

The estimated regression model reveals that green innovation strategy was statistically significant at β=0.119; t = 0.677; p = 0.000. The model indicates that when green innovation strategy remains constant at zero, competitive advantage would be 3.462 and a unit change in green innovation strategy would affect would affect competitive advantage by 0.119. The third step was regressing competitive advantage on performance sustainability as indicated in table 7.

Table 7: Regression Results for Competitive Advantage and Performance Sustainability

			Model summary				
Model	**R**		**R square**	**Adjusted R^2**	**Standard error of estimate**		
1	.460^a		.212	.204	.22756		

				ANOVA			
Model	**Sum of squares**		**df**	**Mean square**	**F**		**Sig.**
Regression	2.062		1	2.062	47.953		0.000b
Residual	9.703		226	.043			
Total	11.765		227				

a. Predictors: (Constant), Competitive advantage
b. Dependent Variable: Performance sustainability

Model	**Unstandardized coefficients**		**Standardized coefficient (beta)**	**t**	**Sig.**
	Beta	**Std error**			

Constant	3.691	.221			16.698	0.000
Competitive advantage	.061	.056	.072		1.090	0.000
Dependent Variable: Performance sustainability						

Source: Survey Data (2022)

The results in table 7 indicated that the adjusted R squared was 0.204 meaning competitive advantage explains 20.4% of the variation of performance sustainability at 95% level of significance. The model was statistically significant at F (1, 226) = 47.953 and the calculated probability is 0.000. The summary for model 7 was:

Performance Sustainability = 3.691 + 0.061Competitive Advantage……………………..…..…..…Model 3

The model indicate that competitive advantage was statistically significant at β=0.061; t = 1.090; p = 0.000. This means that performance sustainability would be 3.691 if competitive advantage would be zero and a unit change in competitive advantage would change performance sustainability by 0.061. In the last step, green innovation strategy and competitive advantage were regressed on performance sustainability as shown in Table 8.

Table 8: Mediation Results

Model summary				
Model	**R**	**R square**	**Adjusted R^2**	**Standard error of estimate**
1	.535[a]	.286	.279	.22622

ANOVA					
Model	**Sum of squares**	**df**	**Mean square**	**F**	**Sig.**
Regression	4.251	2	2.125	64.393	0.000b
Residual	7.514	225	.033		
Total	11.765	227			

a. Predictors: (Constant), Green innovation strategy, Competitive advantage
b. Dependent Variable: Performance sustainability

Model	Unstandardized coefficients		Standardized coefficient (beta)	t	Sig.
	Beta	**Std error**			
Constant	2.613	.603		4.336	0.000
Green innovation strategy	.275	.143	.127	1.922	0.005
Competitive advantage	.056	.056	.066	1.006	0.028
Dependent Variable: Performance sustainability					

Source: Survey Data (2022)

Table 8 results shown that the adjusted R squared was 0.279. This means that 27.9% of the variation in performance sustainability can be explained by green innovation strategy and competitive advantage combined at 95% level of significance. The model was statistically significant at F (2, 225) = 64.393 and the calculated probability is 0.000. The summary for model 4 was:

Performance Sustainability = 2.613 + 0.275Green Innovation Strategy + 0.056Competitive Advantage…………………………………………………………………………………...Model 4

The model indicated that both green innovation strategy and competitive advantage are statistically significant at $\beta=0.275$; $t = 1.922$; $p = 0.005$ and $\beta=0.056$; $t = 1.006$; $p = 0.028$ respectively. Performance sustainability would be 2.613 if both green innovation strategy and competitive advantage would be zero. It can be concluded that both green innovation strategy and competitive advantage has positive relationship with performance sustainability.

The total effect of green innovation strategy on performance sustainability was represented by β_1 of 0.281 in model 1. The direct effect of green innovation strategy on performance sustainability after gaining competitive advantage is represented by β_1 of 0.275 in model 4. The effect of green innovation strategy on competitive advantage (mediating variable) was represented by $\beta_1 = 0.119$ in model 2. The effect of competitive advantage on performance sustainability is represented by $\beta_1 = 0.119$ in model 3. The decision criteria for mediation was shown in table 9.

Table 9: Decision Criteria for Mediation

Model 1	Model 2	Model 3	Model 4	Test	Conclusion
$\beta_1 = 0.281$ (p = 0.050)	-	-	-	Necessary condition	There is an overall relationship to be mediated
$\beta_1 = 0.281$ (p = 0.050)	$\beta_1 = 0.119$ (p = 0.000)	$\beta_1 = 0.061$ (p = 0.050)	$\beta_1 = 0.275$ (p = 0.050) $B_2 = 0.056$ (p = 0.028)	β_{21}- $\beta_{51} = 0.281$-0.275 =0.006 β_1 in model 3.5 is less that β_1 in model 3.2	There is partial mediation

Source: Survey Data (2022)

Table 9 confirms that β_1 coefficient in model 1 is statistically significance hence having a relationship that can be mediated. It was further confirmed that β_1 coefficients in model 2, 3 and model 4 were statistically significant at 95% level of confidence. Additionally, β_2 coefficient in model 4 was noted to be statistically significant. Since β_1 coefficients in model 4 is less than β_1 coefficients in model 1, it can be concluded that competitive advantage had partial mediating effect on the relationship between green innovation strategy and performance sustainability thus rejecting the null hypothesis.

The findings of this study links well with hitherto studies by Anwar (2018) which found that green business model innovation had influence on performance while competitive advantage partially mediated the relationship. It was however noted that study by Wirda et al (2019) and Pratono, et al. (2019) noted that competitive advantage mediated the relationship between GIS and performance of firms. Study by Setyawati et al. (2017) and Ibrahim and Mahmood (2016) further observed that competitive advantage mediates fully the relationship between green innovation strategy and performance of firms.

The postulates of RBV dictates that organizational resources and capabilities when pooled together are key in realizing competitive advantage which lays foundation for performance of firms (Barney, 1991). The green resources and capabilities ought to be effectively combined and often modified to come up with novice, unique and distinctive resources and capabilities. The pool of resources and capabilities should fit the external variations thus making the green innovation strategy success and maintain its competitive advantage.

7.0 Conclusion
This study sought to determine whether competitive advantage has mediating effect on the nexus between green innovation strategy and the performance sustainability of ISO 14001 certified manufacturing firms in Kenya. The study focused on cost leadership and differentiation aspects competitive advantage. It was confirmed from the analysis that competitive advantage had partial mediating effect on the relationship between green innovation strategy and performance sustainability of ISO 14001 certified manufacturing firms in Kenya.

8.0 Policy and Practical Recommendation
Competitive advantage partially mediates the relationship between green innovation strategy and performance sustainability of ISO 14001 certified manufacturing firms in Kenya. It is imperative therefore for the management of firms to ensure they pursue efficient manufacturing processes which lead to lower cost of production. The management should also ensure they utilize tacit knowledge and expertise by their employees, automate process and green them and ensure there is a department in the firm dealing with greening of practices and sustainability in the firm. The management should ensure they train their staff to gain sufficient knowledge on going green and how to address issues of sustainability effectively. The government should also come up with flexible regulatory framework to guide firms which are greening their operation and to provide a fair competition ground of all firms going green.

9.0 Limitations and Future Research
The study was limited in the following ways: The present study was cross sectional study which utilized regression analysis. There is need for the proceeding studies to conduct a longitudinal research so that it may capture the trends as firms adopt green innovation strategy as it takes time to be fully adopted. In terms of analysis there is need to consider other analysis methods like Structural Equation Modelling (SEM), Tobit Spatial Lag Model and Tobit Spatial Error Models and ensure the data is panel or time series so that we may capture the dynamism in the business environment. Lastly, the inquiry was conducted in the realm of ISO 14001 certified manufacturing firms thus limiting the scope. This affect generalization of finding to other sectors and even on manufacturing firms which are not ISO 14001 certified. Future study can be extended to other sectors like banking sector, transport, hospitality and even in maritime sector to validate the results.

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