Jurnal Aplikasi Manajemen, Ekonomi dan Bisnis
Vol. 11, No.1, October 2026
ISSN 2541-1438; E-ISSN 2550-0783
Published by STIM Lasharan Jaya

The Effect of Green Intelectual Capital on Business Sustainability: the Mediating Role of Green Innovation

Fatima Jafar Habeeb[1], Safaa Salih Fathi[2], Naba Mouyad Abdulhussein[3]

[1,2,3]Northern Technical University, Iraq
fatimajh@ntu.edu.iq
safaa.salih@ntu.edu.iq
nabamouyad@ntu.edu.iq

ARTICLE DETAILS

History
Received : 4th August 2026
Revised : 6th September 2026
Accepted : 17th October 2026

Keywords :
green intellectual capital, business sustainability, green innovation

ABSTRACT

The aim associated with this article is to examine the relationship between green intellectual capital and business sustainability. Moreover, it examines the mediating role of green innovation for these relationship. The sample consisted of 147 employers in Nineveh Health Office in Iraq. The responses were obtained through self-administered questionnaire using closeness selection. An progressive Partial Least Squares Structural Equation Modeling (PLS-SEM) and SPSS, Ver. 26 analysis was lead to expose the study outcomes. The study outcomes established the positive effect of green intellectual capital on business sustainability. Additionally, outcomes exposes that green innovation does mediate these relationships. This study offers significant suggestions for business sustainable by improving green human capital and green structural capital; mostly for its exclusive context, the health sector. This study is measured unique since it is one of the rare to provide empirical evidence for the link of green intellectual capital with business sustainability and mediating role of green innovation.

©2026 STIM Lasharan Jaya Makassar

INTRODUCTION

In our contemporary world, the issue of intellectual capital (IC) has become one of the most important factors of production contributing to the production process in organizations, it represents a set of cognitive and organizational capabilities available to an elite group of workers and not others, these capabilities help produce new ideas or develop old ideas, enabling the organization to expand its market share, maximize its strengths, and place it in a better position than its counterparts. But these cognitive capabilities cannot be completed and interact with each other unless they are linked to the use of variables and other factors that help the organization to sustain its work and advance to advanced levels. Based on this, sustainability, which is linked and affected by intellectual capital, can be described as employed for the advantage of all present and coming participants in a way that confirms The efficiency and continuity of work in the long term and the associated results on the economic, social and environmental aspects. Therefore, sustainable business is concerned with the current and future social, environmental and economic impacts associated with its operations. Interest in BS (BS) comes from the 1970s, starting with the first United Nations Environment Conference. More than a decade later, in 1987, A document was presented entitled Our Common Future, which views sustainability as meeting the needs of the current generation without compromising the ability of future generations to meet their needs during that period (Oliveira et al., 2019). Green intellectual capital (GIC) is defined as the knowledge, skills, abilities, experiences and concepts related to environmental protection (Chaudhry, 2016), green human capital (GHC) is defined as a summary of individuals' knowledge, skills, abilities, experiences, attitudes, wisdom, creativity, commitments, etc., with regard to environmental protection or green innovation

*Corresponding Author Email Address: fatimajh@ntu.edu.iq
© 2026 STIM Lasharan Jaya Makassar

(Chen, 2008). Green structural capital(GSC) is defined as institutional knowledge about the shape of organizational processes, structures, technologies, policies and culture (Wang, 2014).

Green relational capital (GRC) represents the organization's interactive relationships with customers, suppliers, allies and partners in a way that achieves environmental management and GI for organizations and enables them to succeed and obtain competitive advantages (Chen, 2008). Green innovation (GI) It is innovation associated with green products and processes, including innovation in technologies that contribute to energy conservation, pollution prevention, waste recycling, green product design, and corporate environmental management (Sterbrink and Westerberg, 2016).

Hence, this research study also aims to examine the mediating influence of GI on the association between GIC (GHC, GSC and GRC) and BS, the presence of strong support from GI is widely recognized as a critical factor in determining the effectiveness and ultimate success of sustainability efforts implemented within organizations.

RESEARCH METHOD

The questionnaire was pretested to ensure content validity and clarity. The questionnaire was developed based on already used scales in previous literature. GIC, and BSwas adapted from Obeidat et al. (2020) with four items, Absamad (2019) with 8 items, Yong et al. (2020) with 12 items, and for GI was adapted from Medina et al. (2011), Weag et al. (2015) and Ganzer et al. (2017) with 12 items respectively. All items were measured using a 5-point Likert scale with responses to statements ranging from (1) strongly disagree to (5) strongly agree.

RESULT AND DISCUSSION

1-The Descriptive analysis of the items of the dimensions of the variables:

a. Analysis of the items of the GICin shares which is regularly referred to as dividends

Table 1: Description and Diagnosis of the items of the GIC.

Items	Response Scale										Mean	Standard Deviation	Relative Importance (%)
	Strongly Agree(5)		Agree (4)		Neutral (3)		Disagree (2)		Strongly Disagree (1)				
	F	%	F	%	F	%	F	%	F	%			
GIC1_1	57	38.8	77	52.4	7	4.7	5	3.4	1	0.7	4.252	0.757	85.0
GIC1_2	35	23.8	103	70.1	7	4.7	2	1.4	0	0.0	4.163	0.562	83.3
GIC1_3	30	20.4	95	64.6	18	12.3	3	2.0	1	0.7	4.020	0.687	80.4
GIC1_4	29	19.7	93	63.3	19	12.9	5	3.4	1	0.7	3.980	0.726	79.6
GIC2_1	37	25.2	84	57.2	23	15.6	3	2.0	0	0.0	4.054	0.700	81.1
GIC2_2	37	25.2	83	56.5	27	18.3	0	0.0	0	0.0	4.068	0.659	81.4
GIC2_3	35	23.8	90	61.2	19	12.9	2	1.4	1	0.7	4.061	0.695	81.2
GIC2_4	46	31.3	82	55.8	19	12.9	0	0.0	0	0.0	4.184	0.641	83.7
GIC3_1	37	25.2	90	61.2	17	11.6	3	2.0	0	0.0	4.095	0.666	81.9
GIC3_2	30	20.5	89	60.5	25	17.0	3	2.0	0	0.0	3.993	0.677	79.9
GIC3_3	32	21.8	95	64.6	18	12.2	1	0.7	1	0.7	4.061	0.654	81.2
GIC3_4	51	34.7	89	60.5	6	4.1	0	0.0	1	0.7	4.286	0.608	85.7

Source : Data Processed, 2026

The results in Table (1) indicate that the sample members demonstrated a high level of agreement regarding the items related to the three dimensions of GIC. The arithmetic means ranged from 3.980 to 4.286 all exceeding the scale's hypothetical mean of 3 while response rates ranged from 79.6% to 85.7%, reflecting a positive perception of the presence of green ICpractices within the organization under study. Standard deviation values ranged from 0.562 to 0.757; these relatively low values indicate a convergence of responses among sample members and a good degree of consensus in their opinions. Item (GIC3_4) recorded the highest arithmetic mean (4.286) and response rate (85.7%), whereas item (GIC1_4) recorded the lowest arithmetic mean (3.980) and response rate (79.6%); nevertheless, both remained within the high agreement range, confirming that the dimensions of green ICare positively evaluated by the sample members.

b. Analysis of BS items:

Table 2: Description and diagnosis of the BS items

Items	Strongly Agree(5)		Agree (4)		Neutral (3)		Disagree (2)		Strongly Disagree (1)		Mean	Standard Deviation	Relative Importance (%)
	F	%	F	%	F	%	F	%	F	%			
BS1_1	42	28.5	92	62.6	10	6.8	1	0.7	2	1.4	4.163	0.693	83.3
BS1_2	45	30.6	86	58.5	14	9.5	0	0.0	2	1.4	4.170	0.706	83.4
BS1_3	45	30.6	83	56.5	18	12.2	1	0.7	0	0.0	4.170	0.656	83.4
BS1_4	32	21.8	94	63.9	16	10.9	2	1.4	3	2.0	4.020	0.754	80.4
BS2_1	41	27.9	86	58.5	17	11.5	1	0.7	2	1.4	4.109	0.732	82.2
BS2_2	31	21.1	97	66.0	18	12.2	1	0.7	0	0.0	4.075	0.598	81.5
BS2_3	43	29.2	87	59.2	14	9.5	2	1.4	1	0.7	4.150	0.696	83.0
BS2_4	43	29.2	93	63.3	11	7.5	0	0.0	0	0.0	4.218	0.568	84.4
BS3_1	45	30.6	93	63.3	8	5.4	1	0.7	0	0.0	4.238	0.577	84.8
BS3_2	40	27.2	93	63.2	12	8.2	2	1.4	0	0.0	4.163	0.620	83.3
BS3_3	54	36.7	80	54.4	12	8.2	0	0.0	1	0.7	4.265	0.665	85.3
BS3_4	54	36.7	78	53.1	15	10.2	0	0.0	0	0.0	4.265	0.634	85.3

Source : Data Processed, 2026

The results in Table (2) indicate that the sample members demonstrated a high level of agreement regarding the BS items; the arithmetic means ranged from 4.020 to 4.265 all exceeding the scale's hypothetical mean of 3 reflecting a positive perception of the level of BS within the organization under study. Response rates ranged from 80.4% to 85.3%, high figures confirming a tendency among respondents to agree with the content of the items. Furthermore, standard deviation values ranged from 0.568 to 0.754, indicating a convergence of responses and a low degree of dispersion. Items (BS3_3) and (BS3_4) recorded the highest arithmetic mean (4.265) and response rate (85.3%) each, while item (BS1_4) showed the lowest arithmetic mean (4.020) and response rate (80.4%); nevertheless, it remained within the high agreement range, demonstrating that BS is positively evaluated by the sample members.

c.Analysis of the GI items

Table 3: Description and Diagnosis of the GI items

Items	Response Scale										Mean	Standard Deviation	Relative Importance (%)
	Strongly Agree(5)		Agree (4)		Neutral (3)		Disagree (2)		Strongly Disagree (1)				
	F	%	F	%	F	%	F	%	F	%			
GI1_1	54	36.7	78	53.1	12	8.2	3	2.0	0	0.0	4.245	0.688	84.9
GI1_2	43	29.3	90	61.2	13	8.8	0	0.0	1	0.7	4.184	0.641	83.7
GI1_3	43	29.3	87	59.1	14	9.5	2	1.4	1	0.7	4.150	0.696	83.0
GI1_4	45	30.6	88	59.9	9	6.1	3	2.0	2	1.4	4.163	0.741	83.3
GI2_1	43	29.3	97	65.9	6	4.1	1	0.7	0	0.0	4.238	0.553	84.8
GI2_2	45	30.6	89	60.5	13	8.9	0	0.0	0	0.0	4.218	0.591	84.4
GI2_3	45	30.6	83	56.5	19	12.9	0	0.0	0	0.0	4.177	0.638	83.5
GI2_4	51	34.7	80	54.4	16	10.9	0	0.0	0	0.0	4.238	0.634	84.8
GI3_1	51	34.7	86	58.5	9	6.1	1	0.7	0	0.0	4.272	0.603	85.4
GI3_2	47	32.0	89	60.5	9	6.1	2	1.4	0	0.0	4.231	0.620	84.6
GI3_3	50	34.0	84	57.1	13	8.9	0	0.0	0	0.0	4.252	0.606	85.0
GI3_4	40	27.2	93	63.3	14	9.5	0	0.0	0	0.0	4.177	0.582	83.5

Source : Data Processed, 2026

It is evident from the results of Table (3) that the sample exhibited a high level of agreement regarding the GI items, as the arithmetic mean ranged between (4.150) and (4.272), all of which are above the hypothetical mean for scale (3). This reflects a positive perception of the level of adoption of GI practices within the researched organization. Response rates also ranged between (83.0%) and (85.4%), which are high percentages indicating agreement among the sample regarding the content of the items. Furthermore, the standard deviation values ranged between (0.553) and (0.741), indicating the convergence of the sample responses and a low degree of dispersion.

Item (GI3_1) recorded the highest arithmetic mean of (4.272) and a response rate of (85.4%), while item (GI1_3) came with the lowest arithmetic mean of (4.150) and a response rate of (83.0%), but it remained within the high level of agreement, which confirms that GI enjoys a positive evaluation by the sample.

Model Evaluation Scales

After completing the descriptive analysis of the data, the study model is evaluated using the Partial Least Squares Structural Equation Modeling (PLS-SEM) methodology, which is considered one of the most appropriate statistical methods for testing the relationships between latent variables. The model is evaluated through two main stages: the first stage involves assessing the Measurement Model, which aims to verify the quality and reliability of the measurement instruments by testing the validity and consistency of the relationships between the latent variables and their indicators. The second stage involves evaluating the Structural Model, which aims to test the causal relationships between latent variables, estimate the strength and direction of these relationships, as well as to test the hypotheses underlying the study model using the Smart-PLS 3 software.

a.Standard Evaluation of Model:
This phase aims to ensure the validity and stability of the variables and indicators through the model. Tables (4), (5)and (6) summarize the reliability measures for the items and dimensions of the study.

Table 4: Model evaluation criteria for the green IC variable

Latent Variables	**Items**	**Outer Loading**		**Internal consistency**		
		≥ 0.7	**Remain?**	**AVE≥0.5**	**Cronbach's Alpha ≥0.7**	**Composite Reliability ≥0.7**
Green Human Capital	GIC1_1	0.733	Yes	0.673	0.836	0.891
	GIC1_2	0.856	Yes			
	GIC1_3	0.892	Yes			
	GIC1_4	0.792	Yes			
Green Structural Capital	GIC2_1	0.758	Yes	0.655	0.823	0.883
	GIC2_2	0.866	Yes			
	GIC2_3	0.841	Yes			
	GIC2_4	0.765	Yes			
Green Relational Capital	GIC3_1	0.775	Yes	0.714	0.865	0.909
	GIC3_2	0.914	Yes			
	GIC3_3	0.886	Yes			
	GIC3_4	0.799	Yes			
GIC				0.505	0.910	0.924

Source : Data Processed, 2026

Table 5: Evaluation Criteria for the BS variable Model

Latent Variables	**Items**	**Outer Loading**		**Internal Consistency**		
		≥ 0.7	**Remain?**	**AVE≥0.5**	**Cronbach's Alpha ≥0.7**	**Composite Reliability ≥0.7**
Social Development	BS1_1	0.808	Yes	0.690	0.850	0.899
	BS1_2	0.841	Yes			
	BS1_3	0.881	Yes			
	BS1_4	0.791	Yes			
Economic Development	BS2_1	0.816	Yes	0.710	0.863	0.907
	BS2_2	0.914	Yes			
	BS2_3	0.830	Yes			
	BS2_4	0.806	Yes			
	BS3_1	0.789	Yes	0.668	0.834	0.889

Environmental Development	BS3_2	0.818	Yes			
	BS3_3	0.872	Yes			
	BS3_4	0.786	Yes			
BS				0.503	0.909	0.924

Source : Data Processed, 2026

Table 6: Evaluation criteria for the GI variable

Latent Variables	**Items**	**Outer Loading**		**Internal Consistency**		
		≥ 0.7	**Remain ?**	**AVE≥0.5**	**Cronbach's Alpha ≥0.7**	**Composite Reliability ≥0.7**
Green Product	GI1_1	0.802	Yes	0.714	0.866	0.909
	GI1_2	0.880	Yes			
	GI1_3	0.895	Yes			
	GI1_4	0.800	Yes			
Green Process	GI2_1	0.824	Yes	0.723	0.871	0.912
	GI2_2	0.898	Yes			
	GI2_3	0.884	Yes			
	GI2_4	0.791	Yes			
Organizational Innovation	GI3_1	0.814	Yes	0.704	0.860	0.905
	GI3_2	0.873	Yes			
	GI3_3	0.854	Yes			
	GI3_4	0.812	Yes			
GI				0.529	0.918	0.931

Source : Data Processed, 2026

The results in Tables 4, 5, and 6 indicate that the measurement model possesses a high degree of validity and reliability. All outer loading coefficients exceeded the minimum acceptable value of (0.70), ranging from (0.733) to (0.914). This demonstrates that all study indicators are strongly correlated with their underlying variables, justifying the retention of all items and the exclusion of any. Furthermore, the results showed that the average extracted variance (AVE) values for all dimensions and main variables exceeded the minimum acceptable value of 0.50, ranging from (0.503) to (0.723). This confirms the convergent validity of the model.

Regarding internal consistency, all variables achieved high values for both Cronbach's alpha and composite reliability. Cronbach's alpha values ranged from (0.823) to (0.918), while

composite reliability values ranged from (0.883) to (0.931), all exceeding the recommended minimum of (0.70). This indicates a high degree of internal consistency and reliability in the study's measures. Based on these results, it can be concluded that the measurement model meets the validity and reliability criteria adopted in the PLS-SEM methodology, thus allowing for the evaluation of the structural model and the testing of the study's hypotheses.

Discriminant validity is a fundamental criterion for evaluating a measurement model. It aims to verify the ability of each underlying variable to be distinguished from other underlying variables, ensuring that the indicators used to measure a specific variable do not measure a different variable. To verify this, the study relied on the Heterotrait-Monotrait ratio (HTMT), one of the most common criteria for assessing discriminant validity within the PLS-SEM methodology. Table (7) presents the results of this criterion, where all HTMT values were below the acceptable maximum of 0.90, confirming the availability of discriminant validity among the study variables and indicating that each latent variable is sufficiently independent of the others and measures the concept it was designed to measure.

Table 7: HTMT Criterion Results

	BS	Economic Development	Environmental Development	Green Human Capital	GI	GIC	Green Process	Green Product	Green Relational Capital	Green Structural Capital
Economic Development	0.797									
Environmental Development	0.766	0.754								
Green Human Capital	0.669	0.627	0.641							
GI	0.781	0.690	0.692	0.680						
GIC	0.786	0.720	0.676	0.784	0.764					
Green Process	0.680	0.599	0.581	0.590	0.801	0.691				
Green Product	0.735	0.569	0.730	0.566	0.826	0.635	0.730			
Green Relational Capital	0.735	0.639	0.640	0.698	0.714	0.769	0.637	0.633		
Green Structural Capital	0.707	0.671	0.533	0.758	0.658	0.812	0.629	0.503	0.733	
Organizational Innovation	0.658	0.663	0.525	0.649	0.754	0.702	0.801	0.573	0.626	0.614
Social Development	0.749	0.719	0.616	0.506	0.687	0.685	0.623	0.650	0.668	0.665

Source : Data Processed, 2026

Structural Model Evaluation

After confirming the reliability and validity of the measurement model, the next step is to evaluate the structural model. This aims to test the assumed causal relationships between the underlying variables and verify the study's hypotheses. This evaluation involves examining the model's explanatory and predictive power using a range of statistical indicators, most notably the coefficient of determination (R^2) and the effect size (f^2). It also includes verifying the absence of (Multicollinearity) among the variables using the variance inflation factor (VIF). The results of these indicators are presented below:

-Variance Inflation Factor (VIF)

Table 8: Variance Inflation Factors

Items	VIF	Items	VIF	Items	VIF	Items	VIF
BS1_1	2.363	BS3_2	2.050	GI2_3	3.068	GIC1_4	1.873
BS1_2	2.537	BS3_3	2.670	GI2_4	2.133	GIC2_1	1.789
BS1_3	2.880	BS3_4	2.138	GI3_1	1.996	GIC2_2	2.769
BS1_4	2.631	GI1_1	2.001	GI3_2	2.490	GIC2_3	2.563
BS2_1	2.836	GI1_2	2.607	GI3_3	2.625	GIC2_4	1.702
BS2_2	3.547	GI1_3	2.817	GI3_4	2.230	GIC3_1	2.023
BS2_3	2.753	GI1_4	1.717	GIC1_1	1.633	GIC3_2	3.759
BS2_4	2.416	GI2_1	2.376	GIC1_2	2.566	GIC3_3	3.360
BS3_1	2.377	GI2_2	3.353	GIC1_3	2.933	GIC3_4	2.045

Source : Data Processed, 2026

From Table (8) shows the Variance Inflation Coefficient (VIF) results for all study indicators, with values ranging from (1.633) to (3.759), all of which are below the acceptable maximum of (5.00). These results indicate the absence of (Multicollinearity) among the indicators, confirming the independence of the variables and the lack of high correlations that could affect the accuracy of estimating the structural model coefficients. Therefore, the study data meet the requirements for structural relationship testing, and the model results can be relied upon to test the study hypotheses.

-Model Quality Evaluation

The quality of the model will be assessed based on both (R2 and F2), and Table (9) shows the values of these criteria.

Table 9: Model Quality criteria Values

Latent Variables	**R^2**	**Explanatory Power**	**f^2**	**Effect Size**
Green Human Capital	0.735	Moderate	2.769	Large
Green Structural Capital	0.749	Moderate	2.985	Large
Green Relational Capital	0.746	Moderate	2.938	Large
BS	0.599	Moderate	0.221	Medium
Social Development	0.700	Moderate	2.333	Large
Economic Development	0.794	Substantial	3.861	Large
Environmental Development	0.703	Moderate	2.369	Large
GI	0.588	Moderate	0.951	Large
Green Product	0.684	Moderate	2.162	Large
Green Process	0.828	Substantial	4.825	Large
Organizational Innovation	0.718	Moderate	2.547	Large

Source : Data Processed, 2026

Table (9) presents the results of the structural model quality assessment based on the coefficient of determination (R^2) and effect size (f^2). The coefficient of determination results indicate that the model has a medium to high explanatory power, with R^2 values ranging from (0.588) to (0.828). The Green Process variable achieved the highest explanatory power at 0.828, followed by Economic Development at 0.794, both falling within the high (substantial) explanatory level. In contrast, the coefficient of determination for the BS variable was 0.599,

indicating that the Green IC and GI variables explain 59.9% of the variance in BS, a medium explanatory power according to PLS-SEM criteria. The GI variable also achieved a value of 0.588, indicating a medium explanatory power for the model in explaining this variable.

As for the effect size (f^2), the results showed that most relationships have a large effect size, with (f^2) values ranging between (0.951) and (4.825), while the variable BS recorded a value of 0.221, representing a medium effect size according to Cohen's criteria. Collectively, these results indicate that the structural model possesses adequate explanatory power and that the independent variables contribute to varying degrees in explaining the variance in the dependent variables, thereby enhancing the reliability of the model and supporting the progression to testing the study's hypotheses.

2.Hypotheses Testing:
The study model's conformity with the data of the study sample was verified by checking the inference indicators of good conformity to the model, as well as ensuring its compliance with the required criteria. Thus, now can test the study hypotheses mentioned in the study methodology, as follows:

First: Correlation Testing
To confirm and verify the first main hypothesis, Spearman's correlation coefficient was calculated using SPSS version 26. The results are as follows:

a. Testing the First Main Hypothesis

Table (10) shows the correlation values between GHC and BS.

Table (10): Correlation between GHC and BS

Variables	**BS**			
Green Human Capital	Correlation Coefficient	CI (95%)		Sig
		Lower	Upper	
	0.646	0.529	0.738	<0.001

Source : Data Processed, 2026

Table (10) shows the results of the test of the correlation relationship between GHC and BS using Spearman's Correlation coefficient. The results demonstrated the existence of a statistically significant positive correlation between the two variables, with a correlation coefficient of (r = 0.646), indicating a moderate to strong correlation between them. The significance level (Sig < 0.001) was less than the adopted significance level (0.05), indicating that the relationship is statistically significant. Furthermore, the 95% confidence interval for the correlation coefficient ranged between (0.529) and (0.738), which does not include the zero value, thereby enhancing the reliability of the result and confirming the stability of the correlation coefficient estimate. Based on this, the hypothesis one is accepted.

b. Testing the Second Main Hypothesis
Table (11) presents the correlation values between GSC and BS.

Table 11: Analysis of the Relationship Between GSC and BS

Variables	**BS**			
Green Structural Capital	Correlation Coefficient	CI (95%)		Sig
		Lower	Upper	
	0.630	0.510	0.726	<0.001

Source : Data Processed, 2026

Table (11) presents the results of the correlation analysis between GSC and BS using Spearman's correlation coefficient. The results indicate a statistically significant positive correlation between the two variables, with a correlation coefficient of r = 0.630, suggesting a moderate to strong relationship. Furthermore, the significance level (Sig < 0.001) is below the established threshold of 0.05, confirming the statistical significance of the relationship. Additionally, the 95% confidence interval ranges from 0.510 to 0.726 and does not include zero, thereby reinforcing the reliability of the result and the stability of the correlation coefficient estimate. Consequently, the second hypothesis is accepted.

c. Testing the Third Main Hypothesis

Table (12) presents the correlation values between GRC and BS.

Table 12: Analysis of the Relationship Between Relational Capital and BS

Variables	**BS**			
Green Relational Capital	Correlation Coefficient	CI (95%)		Sig
		Lower	Upper	
	0.694	0.588	0.777	<0.001

Source : Data Processed, 2026

Table (12) shows the results of the correlation test between GRC and BS using Spearman's Correlation coefficient. The results indicated the presence of a strong positive correlation with statistical significance between the two variables, where the correlation coefficient was (r = 0.694), suggesting that as the level of GRC increases, the level of BS also increases. The significance level was (Sig < 0.001), which is below the adopted significance level (0.05), confirming the statistical significance of the relationship. Additionally, the 95% confidence interval ranged between (0.588) and (0.777), which does not include zero, further enhancing the reliability of the result and confirming the stability of the correlation coefficient estimate. Accordingly, the null hypothesis is rejected and the alternative hypothesis is accepted, which states that there is a statistically significant correlation between GRC and BS.

d. Effect Testing

1.Testing GHC in BS through GI

Figure (2) shows the model diagram for this hypothesis, and Table (13) shows the results of the structural model analysis, which accept fourth hypothesis.

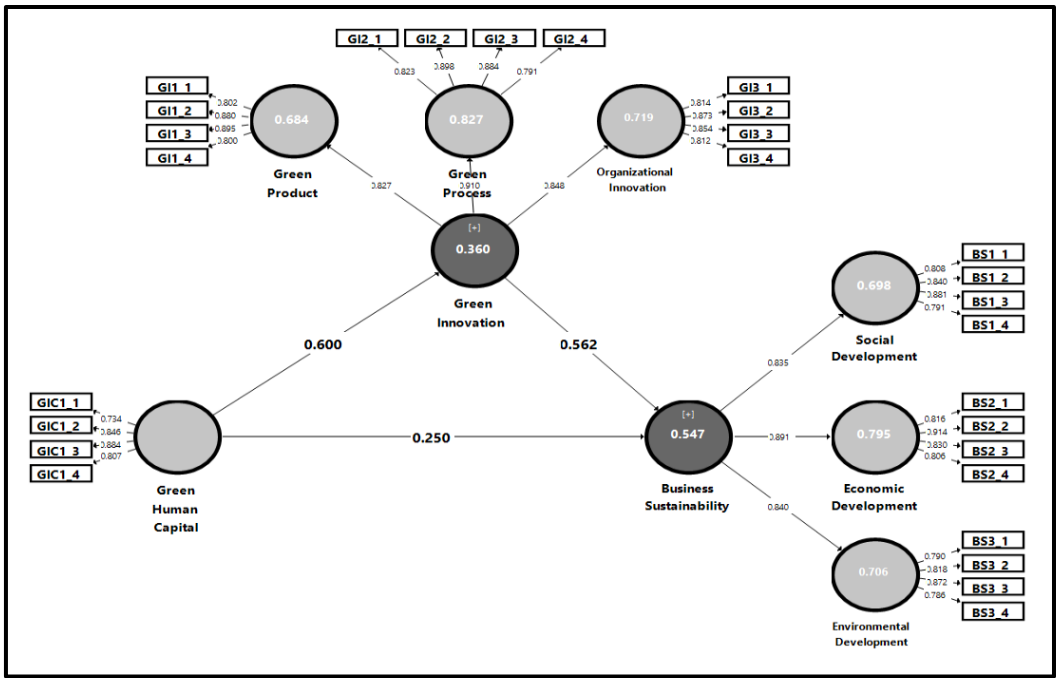


Figure (2): The impact of GHC on BS through GI

Table (13): The impact of GHC on BS through GI

Indirect Path	Original Sample (β)	Standard Deviation	T Statistic	P Value	CI (95%)	
					Lower	**Upper**
GHC → GI →BS	0.337	0.054	6.255	<0.001	0.250	0.460

Source : Data Processed, 2026

The results of Table (13) indicate the presence of a significant indirect effect of GHC on BS through GI, as the value of the indirect effect coefficient reached (β = 0.337), a positive value reflecting that enhancing GHC contributes to increasing the level of BS through the development of GI. The statistical value reached (T = 6.255), which is higher than the benchmark value (1.96), while the statistical significance value was (P < 0.001), confirming the significance of this effect at the 0.05 significance level. Additionally, the confidence interval (95%) ranged between (0.250–0.460) and did not include zero, which reinforces the reliability of the indirect effect. Based on this, the fourth null hypothesis, which states that GI does not significantly mediate the relationship between GHC and BS, is rejected, and the alternative hypothesis is accepted, indicating that GI plays the role of a significant mediator in transforming the capabilities, skills, and knowledge of GHC into practices that enhance BS.

e. Testing the mediating role of GI on the relationship between green structural capital and BS.

Figure (3) presents the model diagram for this hypothesis, while Table (14) shows the results of the structural model analysis, indicating the accepting of the fifth main hypothesis.

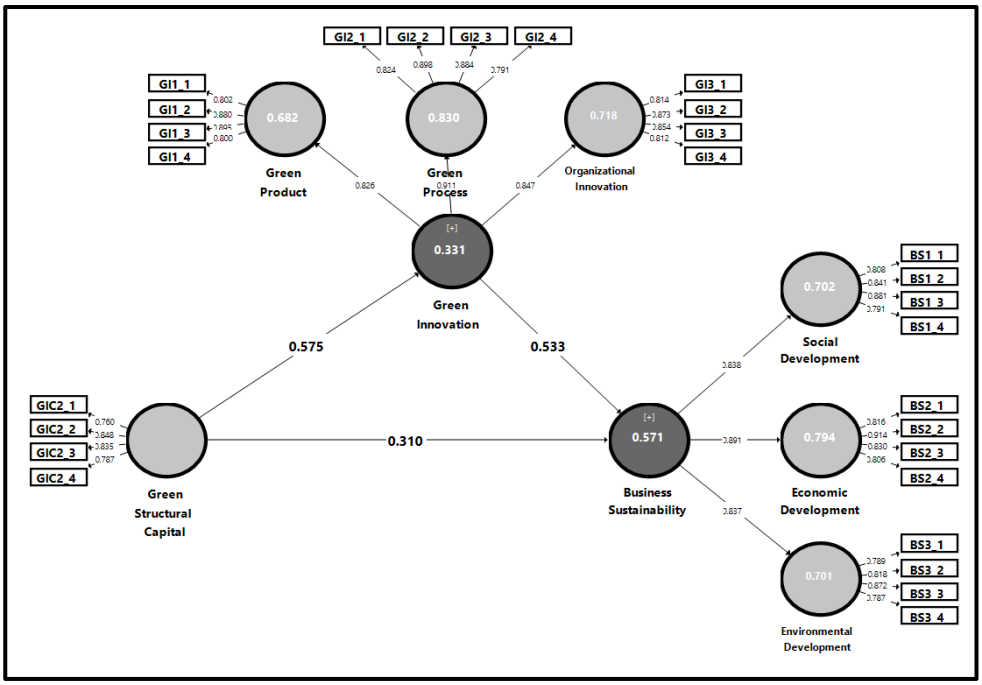


Figure (3): The impact of GSC on BS through GI

Table (14): The impact of GSC on BS through GI

Indirect Path	Original Sample (β)	Standard Deviation	T Statistic	P Value	CI (95%)	
					Lower	Upper
GSC → GI →BS	0.307	0.045	6.765	<0.001	0.229	0.405

Source : Data Processed, 2026

The results of Table (14) indicate the presence of a significant indirect effect of GSC on BS through GI, with the indirect effect coefficient reaching (β = 0.307), a positive effect indicating that the development of GSC contributes to enhancing BS by supporting GI. The statistical value reached (T = 6.765), which is higher than the standard value (1.96), while the significance level was (P < 0.001), confirming the significance of this effect at the 0.05 level. Additionally, the 95% confidence interval, ranging between (0.229–0.405), did not include zero, further supporting the reliability of the indirect effect. Accordingly, the fifth null hypothesis is rejected, and the alternative hypothesis is accepted, confirming that GI serves as a significant mediator in the relationship between GSC and BS.

f. Testing GRC in BS through GI

Figure (4) shows the model diagram for this hypothesis, and Table (15) shows the results of the structural model analysis, which indicate the accepting of the sixth main hypothesis.

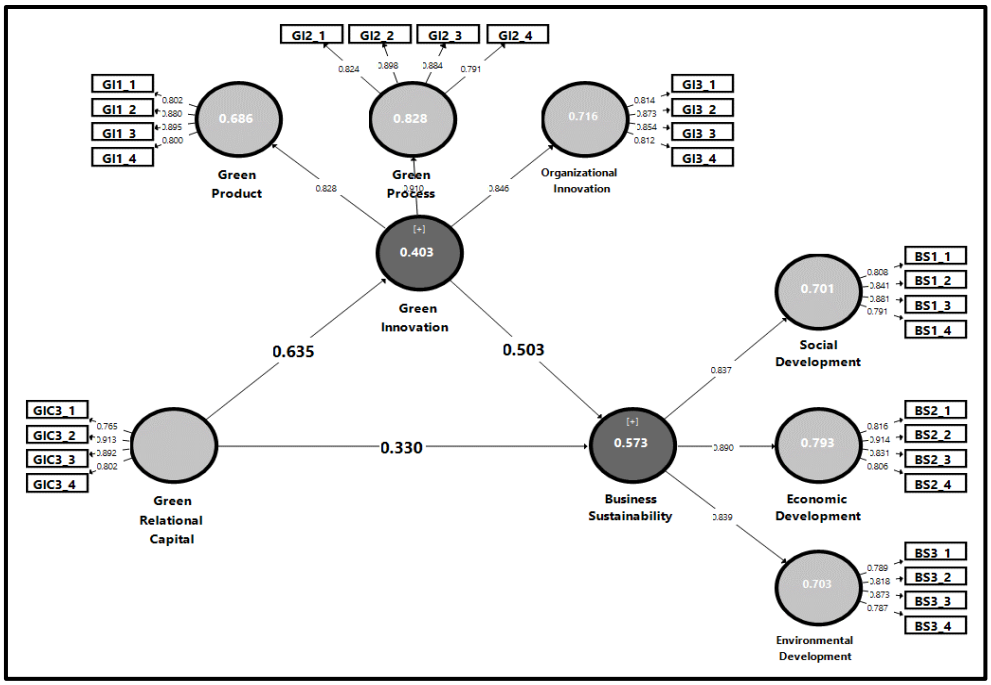


Figure (4):The effect of GRC in BS through GI.

Table (15): The effect of GRC in the BS through GI.

Indirect Path	Original Sample (β)	Standard Deviation	T Statistic	P Value	CI (95%)	
					Lower	Upper
GRC → GI →BS	0.319	0.054	5.955	<0.001	0.228	0.436

Source : Data Processed, 2026

The results of Table (15) indicate a significant indirect effect of GRC on BS through GI, with an indirect effect coefficient of (β = 0.319), which is a positive effect reflecting that enhancing GRC contributes to improving BS by stimulating GI. The statistical value was (T = 5.955), exceeding the critical value (1.96), while the significance value was (P < 0.001), confirming the significance of this effect at the (0.05) level. Additionally, the 95% confidence interval, ranging from (0.228–0.436), did not include zero, which reinforces the reliability and accuracy of the statistical estimate of the indirect effect. Accordingly, the sixth null hypothesis is rejected, and the alternative hypothesis is accepted, confirming that GI plays a significant mediating role in the relationship between GRC and BS.

DISCUSSION

Hypothesis 1 suggests that there happens a positive relationship between GHC and sustainability. The importance of GHC has been stayed by preceding study (Delmas and Pekovic, 2013; Epstein and Buhovac, 2014). GHC provide individuality, which offers corporations an advantage over contestants. GHC is fixed in employees' understanding and skill, so it can be missing when they leave. Therefore, organizations should reserve this capital. Organizations that distribute resources to improving the knowledge and abilities of their staff in relative to sustainability tend to exhibition greater performance in relations of economic, environmental, and social sustainability features. The above-mentioned result is supported by speculative excuse, as staffs who

possess knowledge and abilities related to sustainability are more disposed to contribute in sustainable behaviors and make helps towards the achievement of sustainability goals.

Furthermore, H2 suggested that there occurs a positive relationship between GSC and sustainability. The practical investigation offers indication in service of the hypothesis. This result is regular with the idea that the attendance of effective structures, procedures, and systems to provision sustainability actions is vital for reaching sustainability goals (Sánchez et al., 2007).

Furthermore, , H3 suggested a positive connection between GRC and sustainability. In difference to the primary evidence, the practical examination displays a important suggestion to corroborate the idea that GRC shows a direct positive relationship with sustainability. The preceding studies have consistently highlighted the importance of full-bodied relationships and associations in encouraging sustainability objectives (Hahn et al., 2015; Long and Liao, 2023).

Concerning communication relationships, in H4, it is hypothesized that there is a positive mediating effect of GI on the suggestion between GHC and BS. The practical examination produced decisive outcomes, as the analysis did offer extensive proof to provision the hypothesis. which suggest that the confirmation of GI can intensify the effectiveness of GIC in encouraging sustainability activities. The results of this study show that the impact of GI on the suggestion between GHC and BS is depending upon appropriate issues and other organizational variables. Moreover, the level of GI engagement may differ through several organizations.

Equally, H5 is too accepted. The results indicate the presence of a significant indirect influence of GSC on BS through GI. Finally, Hypothesis 6 that indicate a significant indirect effect of GRC on BS through GI.

The above is supported by the study's of (Iqbal, 2023) Which it findings indicate significant associations and impacts of green IC and GI on the corporate sustainability of manufacturing firms in Pakistan. Furthermore, the outcomes indicated that GI mediates the relationship between green IC and corporate sustainability. Hence, it is strongly recommended that Pakistani firms should integrate GI practices into their operations to effectively pursue corporate sustainability.

In addition, The result showed the green process innovation has positive effect on corporate sustainability and the environmental performance can moderate the relationship between green process innovation and corporate sustainability (Khairani et al., 2021).

CONCLUSION

In sudden, this study has providing an inclusive sympathetic of the multifaceted interaction between GIC, BS and GI in the exact situation of the health sector in Iraq. The experimental indication cares the idea that GHC and GSC have a famous helpful effect on BS, highlighting their vital parts in supporting sustainable practices. However, the results of the study expression a strong and direct correlation between GRC and BS. Furthermore, the predictable moderating impact of GI on the relationship between green human and structural capital, did manifest as expected. The above-mentioned results improve the general conception of

sustainability subtleties within the health sector, importance the requirement for complicated and state-exact methods. The novelty of this work is fixed in its delivery of practical indication that founds a joining between GIC, GI and BS. Moreover, it suggestions visions into the complicated environment of these connections exactly in the health sector.

REFERENCES

Ab Samad, N. H. B., Yusoff, N. M., & Ismail, R. F. (2019). Effectiveness of social enterprise in managing intellectual capital. *International Journal of Financial Research, 10*(3), 1923–4031.

Ali, M., Puah, C.-H., Ayob, N., & Raza, S. A. (2020). Factors influencing tourists' satisfaction, loyalty and word of mouth in selection of local foods in Pakistan. *British Food Journal, 122*(6), 2021–2043.

Amoah, J., Egala, S. B., Keelson, S., Bruce, E., Dziwornu, R., & Duah, F. A. (2023). Driving factors to competitive sustainability of SMEs in the tourism sector: An introspective analysis. *Cogent Business & Management, 10*(1), Article 2163796.

Chaudhry, N. I., Bilal, A., Awan, M., & Bashir, A. (2016). The role of environmental consciousness, green intellectual capital management and competitive advantage on financial performance of the firms: An evidence from manufacturing sector of Pakistan. *Journal of Quality and Technology Management, 12*, 51–70.

Chen, Y.-S. (2008). The positive effect of green innovation capital on competitive advantages of firms. *Journal of Business Ethics, 77*, 271–286.

Delmas, M. A., & Pekovic, S. (2013). Environmental standards and labor productivity: Understanding the mechanisms that sustain sustainability. *Journal of Organizational Behavior, 34*(2), 230–252.

Epstein, M. J., & Buhovac, A. R. (2014). *Making sustainability work: Best practices in managing and measuring corporate social, environmental, and economic impacts*. Berrett-Koehler Publishers.

Ganzer, P. P., Chais, C., & Olea, P. M. (2017). Product process marketing and organizational innovation in industries of the flat knitting sector. *[Nama jurnal belum teridentifikasi], 14*.

Hahn, R., Reimsbach, D., & Schiemann, F. (2015). An empirical analysis of the relationship between the indicators of corporate social responsibility and corporate financial performance: Evidence from the European chemical industry. *Ecological Economics, 109*, 1–12.

Hair, J. F., Jr., Matthews, L. M., Matthews, R. L., & Sarstedt, M. (2017). PLS-SEM or CB-SEM: Updated guidelines on which method to use. *International Journal of Multivariate Data Analysis, 1*(2), 107.

Hair, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., & Thiele, K. O. (2017). Mirror, mirror on the wall: A comparative evaluation of composite-based structural equation modeling methods. *Journal of the Academy of Marketing Science, 45*(5), 616–632.

Iqbal, M. A. B., Zafar, R., Imran, M., Khan, W. A., Batool, S., & Sadiq, W. (2023). Impact of green intellectual capital on corporate sustainability with mediating role of green innovation. *Russian Law Journal, 11*(3).

Juschten, M., Jiricka-Pürrer, A., Unbehaun, W., & Hössinger, R. (2019). The mountains are calling! An extended TPB model for understanding metropolitan residents' intentions to visit nearby alpine destinations in summer. *Tourism Management, 75*, 293–306.

Khairani, S., Susetyo, D., Yusnaini, E., & Yusrianti, H. (2021). The effect of green process innovation on corporate sustainability and environmental performance as a mediation variable. In *Proceedings of the 7th Sriwijaya Economics, Accounting, and Business Conference (SEABC 2021)* (Advances in Economics, Business and Management Research, Vol. 210).

Kott, P. S. (2021). *Encyclopedia of social network analysis and mining*. Springer.

Li, D., Zhao, Y., Zhang, L., Chen, X., & Cao, C. (2018). Impact of quality management on green innovation. *Journal of Cleaner Production, 170*.

Ma, Y., Hou, G., & Xiu, B. (2017). Green process innovation and innovation benefits: The mediating effect of firm image. *Sustainability, 9*.

Marsden, P. V., & Campbell, K. E. (2021). *Social networks: Development, management, and organization*. Routledge.

Medina, P. S., Crobett, J., & Lopez, A. T. (2011). Environmental innovation and sustainability in small handicraft businesses in Mexico. *Sustainability, 3*.

Obeidat, S. M., Al Bakri, A. A., & Elbanna, S. (2020). Leveraging "green" human resource practices to enable environmental and organizational performance: Evidence from the Qatari oil and gas industry. *Journal of Business Ethics, 164*(2), 371–388.

Oliveira, E. W. M., De Melo, M. F. D., Silva, W. L. D., & Polo, E. F. (2019). The business of the business is not just the business: BSA's strategic element. *Revista de Administração da UFSM, 12*(1), 41–53.

Shahbaz, M., Rashid, N., Saleem, J., Mackey, H., McKay, G., & Al-Ansari, T. (2023). A review of waste management approaches to maximize sustainable value of waste from the oil and gas industry and potential for the state of Qatar. *Fuel, 332*, Article 126220.

Sterbrink, P., & Westerberg, P. (2016). *Developing green innovation within 4PLs: Pursuing green logistics* [Master's thesis]. Högskolan i Gävle.

Tourangeau, R., Rips, L. J., & Rasinski, K. (2000). *The psychology of survey response*. Cambridge University Press.

Wang, Y. X., Wang, S., & Chang, Y. (2019). Product innovation and process innovation in a dynamic Stackelberg game. *Computers & Industrial Engineering, 130*, 395–403. https://doi.org/10.1016/j.cie.2019.02.042

Weag, H.-H., Chen, J.-S., & Chen, P.-C. (2015). Effect of green innovation on environmental and corporate performance: A stakeholder perspective. *Sustainability, 7*.

Yusliza, M. Y., Yong, J. Y., Tanveer, M. I., Ramayah, T., Faezah, J. N., & Muhammad, Z. (2020). A structural model of the impact of green intellectual capital on sustainable performance. *Journal of Cleaner Production, 249*, Article 119334.

Yusoff, Y. M., Omar, M. K., Zaman, M. D. K., & Samad, S. (2019). Do all elements of green intellectual capital contribute toward business sustainability? Evidence from the Malaysian context using the Partial Least Squares method. *Journal of Cleaner Production, 234*, 626–637.