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# Green Transformational Leadership and Its Impact on Employee Work Engagement: An Exploratory Study of the opinions of a Sample of Employees at the Nineveh Education Directorate

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**Abstract.** Amongst increasing attention in administrative and leadership practices that support environmental advantages and adoptive employee engagement and integration within the office, this study objectives to classify the influence of green transformational leadership on the job engagement of employees at the Nineveh Education Directorate. The study statements the need to cognize the amount to which green transformational leadership contributes to improving employee job engagement. To realize this neutral, a descriptive-analytical approach was approved due to its suitability for the study's nature and objectives; the study population contained of employees from the Nineveh Education Directorate, with a sample of 80 employees selected for the study. A questionnaire helped as the prime instrument for data collection, and the data were analyzed using SPSS (Ver. 26) and (PLS- SEM), using statistical techniques suitable for the data features and hypothesis testing. The study tests green transformational leadership as the independent variable and job engagement as the dependent variable, aiming to discover the nature of the relationship and effect between them. The results reveal the extent to which green transformational leadership dimensions are practiced and their impact on the job engagement of the sample members. Moreover, the study suggestions conclusions and recommendations to assist the Nineveh Education Directorate's management in strengthening green-oriented leadership practices, thereby supportive employee participation and increasing their level of engagement at work.

**Keywords:** Green Transformational Leadership, Job Engagement, Nineveh Education Directorate.

## 1. Introduction

Fast changes within modern organizations have required the advent of modern leadership styles skilled of managing and inspiring employees, in addition to adopting their engagement in achieving organizational objectives. In this situation, "Green Transformational Leadership" has occurred as a style that mixes transformational leadership principles with environmental directions; it does so by moving and motivating employees and steering their behavior toward adopting green practices (Yusliza et al., 2025). Latest studies have established that this leadership style is related to a variety of positive employee results, mostly environmentally concerned with behaviors and practices (Su and Hahn, 2025; Kaya and Atsan, 2025).

Equally, employee engagement attitudes as a vital notion in organizational behavior, replicating an employee's energy, commitment, and deep involvement in their work. Leadership plays a essential role in this area through its capability to effect employee motivations and attitudes, while enhancing their engagement and interaction with their work. A current study proved that green leadership is related both directly and indirectly to employee engagement through the medium of green organizational culture (Gao et al., 2026). Additional study recognized a relationship between green transformational leadership and work engagement, emphasizing the role of engagement in translating leadership practices into positive employee results (Oktaysoy, 2025). Despite rising concern in this tendency, new revisions have mainly absorbed on

green work engagement and environmental behaviors; equally, study lecturing the impact of green transformational leadership on common employee engagement relics incomplete, mainly in government and scholastic institutes. So, the current study pursues to speech this gap by exploratory the influence of green transformational leadership on employee engagement at the Nineveh Directorate of Education, discovering the nature of the relationship between these variables, and decisive the range to which dimensions of green transformational leadership contribute to improving employee engagement. The study is structured around three unified sections: the first addresses the theoretical framework and previous studies; the second outlines the methodology, fieldwork procedures, data analysis, and hypothesis testing; and the third is devoted to discussing the results, drawing conclusions, and offering commendations and proposals for future study.

## 2. Theoretical Framework and Hypotheses

### 2.1 Green Transformational Leadership

Over the previous two eras, transformational leadership has held a position of high significance within the field of leadership studies (Liu and Yu, 2023). Green transformational leadership signifies a recent tendency in leadership thought, developing from the combination of transformational leadership principles with environmental alignments; its goal is to monitor employees near accepting an organizational vision that highlights the environmental dimension.
This leadership style trusts on the leader's capability to effect, inspire, and motivate employees to go outside the supplies of their immediate job roles, guiding this impact toward completing the organization's green goals and practices. Green transformational leadership is famed by its capacity to build a shared environmental vision, foster environmental awareness, and encourage employees to devise innovative ways to address environmental challenges within the organization (Yusliza et al., 2025). The attendance of green transformational leadership with its unique features effectively inspires employees and improves their participation in environmental advantages, thereby establishment their loyalty and organizational commitment. Also, it encourages the organization's appearance as a socially and environmentally accountable object, improving its reputation and stakeholder relationships; this fosters greater trust and loyalty, finally ornamental business relatives between the organization and all its connections.

Green transformational leadership comprises four dimensions: green ideal influence, green intellectual stimulation, green individual consideration and green inspirational motivation (Bni Aissa and Aljaafreh, 2026).

### 2.2 Employee Engagement

Job engagement is a main idea in organizational behavior, reproducing the degree to which an employee is involved in and connected to their work across physical, cognitive, emotional, and behavioral dimensions. Involved employees are branded by high energy, a strong connection to their work, and the capability to achieve jobs efficiently.

Saks and Gruman defined job engagement as a multidimensional construct encompassing physical, cognitive, emotional, and behavioral aspects; engaged employees exhibit high energy, work attachment, and the ability to perform tasks efficiently. Furthermore, engagement levels are influenced by the availability of personal and job-related resources such as self-efficacy, resilience, social support, feedback, and development opportunities as well as by leadership practices and a focus on employee health and well-being. This occurs when individuals realize that their job roles play a pivotal part in meeting their expectations and achieving the goals they are working toward whether personal or organizational.

A Gallup (2016) study found that high levels of work engagement are linked to employees' sense that their work and tasks are meaningful; the study noted that this connection plays a crucial role in task engagement and reduces employee turnover (Gandhi and Robison, 2021). Furthermore, Ahmed et al. (2016) demonstrated that when employees find their work purposeful and meaningful, they develop a desire to engage with it, viewing their work as playing a significant role in life and serving both their personal goals and those of their organization. Additionally, numerous studies across various organizations have confirmed that the nature of the work itself is a fundamental factor in work engagement and a catalyst for increased employee participation. Research by (Fouché et al. ,2017; Van Wingerden and Poell ,2019) has shown a statistically significant positive relationship between meaningful work and work engagement. Similarly, findings from (Karataş and Özdemir, 2022) indicated a statistically significant, moderately strong positive relationship between meaningful work and work engagement. When employees perceive their work as meaningful, it tends to foster a sense of importance, belonging, and job satisfaction, motivating them to engage actively and

thereby enhancing their work engagement. A study by Khusanova, Kang, and Choi ,2021) identified a positive relationship between work and job engagement (Li et al., 2024). Accordingly, job engagement is understood as a state characterized by active participation, Feeling the importance of work, belonging, and job satisfaction (Gandhi and Robison, 2021; Li et al., 2024).

### 2.3 The Relationship Between Green Transformational Leadership and Employee Engagement

Previous research has revealed that green transformational leadership and green human resource management (GHRM) practices play a crucial role in shaping employees' environmental behavior. However, earlier studies adopted a dual approach to examining the effects of green transformational leadership and GHRM, often overlooking their combined impact (Peng et al., 2020).
In addition, green transformational leadership had a significant influence on green organizational identity and green organizational achieved mediation in the relationship between green transformational leadership and green creativity (Al-Ghazali et al., 2022).

Furthermore, Suliman et al. (2023) has investigated the influence of green transformational leadership on employees' environmental performance and green work engagement in the hotel business.

Based on the foregoing, the researchers examined the relationship between green transformational leadership and employee engagement among the staff of the Nineveh Directorate of Education in Iraq.

Accordingly, the following hypotheses were formulated:

H1: There is a significant correlation between green transformational leadership and job engagement of employees in the researched organization.
H1.1: There is a significant correlation between dimensions of green transformational leadership (individually) and job engagement of employees (combined) in the researched organization.
H2: There is a significant effect of the green transformational leadership on the job engagement of employees in the researched organization.
H2.1: There is a significant effect of the dimensions of green transformational leadership (individually) on the job engagement of employees (combined) in the researched organization.

### 2.4 Proposed Conceptual Framework

Developing a theoretical model required a rigorous review of the relevant literature and the formulation of preliminary hypotheses. Given that a single existing model could not fully explain the study context, the researchers developed a conceptual model based on a framework incorporating the key components of green transformational leadership and work engagement (Figure 1). Furthermore, the dimensions of green transformational leadership included: green idealized influence, green inspirational motivation, green individual considerations, and green intellectual stimulation (Bni Aissa and Aljaafreh, 2026). The elements of work engagement were derived from studies addressing active participation, feeling the importance of work, belonging, and job satisfaction (Al-Zaboun et al., 2023).

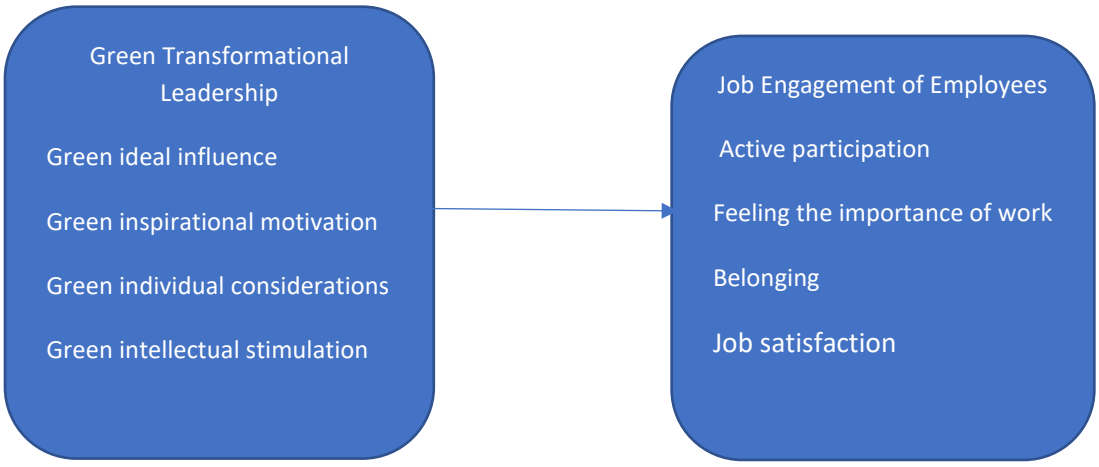



**Figure 1:** Conceptual Framework

**Methodology and Findings:**

**Methodology:**

The researchers implemented a quantitative research technique in the study. All data was collected from the employees working in the Nineveh education directorate in Iraq. The researchers implemented a conceptual framework for determining the relationship between the green transformational leadership and job engagement of employees. They distributed the survey questionnaires physically to the randomly-selected respondents. The questionnaires were written in the Arabic languages. The questionnaires included 4 sections; Section 1 included questions related to the demographic information of the respondents; Section 2 covered the green transformational leadership dimensions (16 items); Section 3 highlighted the job engagement of employees (16 items). These questionnaires were distributed amongst 100 employees. Out of the 80 questionnaires that were collected, 20 were filled (i.e., 80%) Thereafter, these were categorised and analysed. Thus, it was concluded that the employees were willing to share information with the researchers which increased their trust in the data.

**Findings:**

**Data Presentation and Analysis**

**First: Descriptive Analysis of the Questionnaire Items**

Frequencies, percentages, relative importance indices, arithmetic means, standard deviations, and relative importance values will be calculated for all items across the questionnaire's dimensions.

1- Descriptive Analysis of Items for the "Green Transformational Leadership" Variable Dimensions:
Frequencies, percentages, arithmetic means, standard deviations, and response rates were calculated for the dimensions of the "Green Transformational Leadership" variable, as shown in the tables below:

a. Analysis of "Green Idealized Influence" Items:

**Table (1):** Description and Analysis of Items Green Ideal Effect

| 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 | % | | | |
| GIE_1 | 38 | 47.5 | 40 | 50.0 | 2 | 2.5 | 0 | 0.0 | 0 | 0.0 | 4.450 | 0.549 | 89.0 |
| GIE_2 | 37 | 46.2 | 38 | 47.5 | 5 | 6.3 | 0 | 0.0 | 0 | 0.0 | 4.400 | 0.608 | 88.0 |
| GIE_3 | 31 | 38.8 | 47 | 58.7 | 2 | 2.5 | 0 | 0.0 | 0 | 0.0 | 4.362 | 0.534 | 87.3 |
| GIE_4 | 30 | 37.5 | 43 | 53.7 | 7 | 8.8 | 0 | 0.0 | 0 | 0.0 | 4.287 | 0.620 | 85.8 |
| GIE | 42.5% | | 52.5% | | 5.0% | | 0.0% | | 0.0% | | 4.375 | 0.578 | 87.5% |
| | 95.0% | | | | | | 0.0% | | | | | | |

Table (1) shows that the "Green Ideal Effect" dimension represented by items GIE_1 through GIE_4 achieved an agreement rate ("Strongly Agree" and "Agree") of 95.0% among the total sample, while the disagreement rate ("Disagree" and "Strongly Disagree") was 0.0%, and the neutral response rate was 5.0%. These outcomes are stayed by a mean score of 4.375, a standard deviation of 0.578, and a response rate of 87.5%, specifying a high level of awareness among sample members concerning Green Ideal Influence practices. Item GIE_1"The manager acts in a manner that earns the trust of the directorate's employees" recorded the highest mean score at 4.450, with a standard deviation of 0.549 and a response rate of 89.0%.
a. Analysis of "Green Inspirational Motivation" items:

**Table (2):** Description and analysis of items Green Inspirational Motivation

| 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 | % | | | |
| GIM_1 | 20 | 25.0 | 54 | 67.5 | 6 | 7.5 | 0 | 0.0 | 0 | 0.0 | 4.175 | 0.546 | 83.5 |
| GIM_2 | 20 | 25.0 | 54 | 67.5 | 6 | 7.5 | 0 | 0.0 | 0 | 0.0 | 4.175 | 0.546 | 83.5 |
| GIM_3 | 24 | 30.0 | 51 | 63.7 | 5 | 6.3 | 0 | 0.0 | 0 | 0.0 | 4.237 | 0.557 | 84.8 |
| GIM_4 | 24 | 30.0 | 48 | 60.0 | 8 | 10.0 | 0 | 0.0 | 0 | 0.0 | 4.200 | 0.604 | 84.0 |
| GIM | 27.5% | | 64.7% | | 7.8% | | 0.0% | | 0.0% | | 4.197 | 0.563 | 83.9% |
| | 92.2% | | | | | | 0.0% | | | | | | |

Table (2) shows that the "Green Inspirational Motivation" dimension represented by items GIM_1 through GIM_4 achieved an agreement rate ("Strongly Agree" and "Agree") of 92.2% among the total sample, while the disagreement rate ("Disagree" and "Strongly Disagree") was 0.0%, and the neutral response rate was 7.8%. These results are supported by a mean of 4.197, a standard deviation of 0.563, and a response rate of 83.9%. Item GIM_3 which statuses, "The directorate's management offers periodic group rewards to employees, fostering a unified team spirit" recorded the highest mean at 4.237, with a standard deviation of 0.557 and a response rate of 84.8%.

a. Analysis of "Green Individual Considerations" items:

**Table (3):** Description and analysis of "Green Individual Considerations" 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 | % | | | |
| GIC_1 | 22 | 27.5 | 54 | 67.5 | 4 | 5.0 | 0 | 0.0 | 0 | 0.0 | 4.225 | 0.527 | 84.5 |
| GIC_2 | 24 | 30.0 | 54 | 67.5 | 2 | 2.5 | 0 | 0.0 | 0 | 0.0 | 4.275 | 0.503 | 85.5 |
| GIC_3 | 26 | 32.5 | 52 | 65.0 | 2 | 2.5 | 0 | 0.0 | 0 | 0.0 | 4.300 | 0.513 | 86.0 |
| GIC_4 | 27 | 33.8 | 49 | 61.2 | 4 | 5.0 | 0 | 0.0 | 0 | 0.0 | 4.287 | 0.556 | 85.8 |
| GIC | 31.0% | | 65.3% | | 3.7% | | 0.0% | | 0.0% | | 4.272 | 0.525 | 85.4% |
| | 96.3% | | | | | | 0.0% | | | | | | |

Table (3) displays that the "Green Individual Considerations" dimension signified by items GIC_1 through GIC_4 received an agreement rate ("Strongly Agree" and "Agree") of 96.3% among the total sample, while the disagreement rate ("Disagree" and "Strongly Disagree") was 0.0%, and the neutral response rate was 3.7%. These outcomes are stayed by a mean score of 4.272, a standard deviation of 0.525, and a response rate of 85.4%. Item GIC_3 which states, "The directorate's management esteems the environmental beliefs of employees" achieved the highest mean score at 4.300, with a standard deviation of 0.513 and a response rate of 86.0%.

a. Analysis of "Green Intellectual Stimulation" items:

**Table (4):** Description and analysis of "Green Intellectual Stimulation" 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 | % | | | |
| GIS_1 | 19 | 23.8 | 57 | 71.2 | 4 | 5.0 | 0 | 0.0 | 0 | 0.0 | 4.188 | 0.506 | 83.8 |
| GIS_2 | 20 | 25.0 | 52 | 65.0 | 8 | 10.0 | 0 | 0.0 | 0 | 0.0 | 4.150 | 0.576 | 83.0 |
| GIS_3 | 26 | 32.5 | 50 | 62.5 | 4 | 5.0 | 0 | 0.0 | 0 | 0.0 | 4.275 | 0.551 | 85.5 |
| GIS_4 | 22 | 27.5 | 51 | 63.7 | 7 | 8.8 | 0 | 0.0 | 0 | 0.0 | 4.188 | 0.576 | 83.8 |
| GIS | 27.2% | | 65.6% | | 7.2% | | 0.0% | | 0.0% | | 4.200 | 0.552 | 84.0% |
| | 92.8% | | | | | | 0.0% | | | | | | |

Table (4) shows that the "Green Intellectual Stimulation" dimension represented by items GIS_1 through GIS_4 achieved an agreement rate ("Strongly Agree" and "Agree") of 92.8% among the total sample, while the disagreement rate ("Disagree" and "Strongly Disagree") was 0.0%, and the neutral response rate was 7.2%. These results are supported by a mean of 4.200, a standard deviation of 0.552, and a response rate of 84.0%. Item GIS_3 which states, "The directorate's management works to enhance employee efficiency through effective training programs" recorded the highest mean (4.275), with a standard deviation of 0.551 and a response rate of 85.5%.

1- Descriptive analysis of the items for the "Job Engagement of Employees" variable dimensions:
Frequencies, percentages, means, standard deviations, and response rates were calculated for the dimensions of the "Job Engagement of Employees" variable, as shown in the tables below:
a. Analysis of "Active Participation" items:

**Table (5):** Description and analysis of "Active Participation" 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 | % | | | |
| AP_1 | 23 | 28.8 | 51 | 63.7 | 6 | 7.5 | 0 | 0.0 | 0 | 0.0 | 4.213 | 0.567 | 84.3 |
| AP_2 | 32 | 40.0 | 46 | 57.5 | 2 | 2.5 | 0 | 0.0 | 0 | 0.0 | 4.375 | 0.537 | 87.5 |
| AP_3 | 25 | 31.2 | 54 | 67.5 | 1 | 1.3 | 0 | 0.0 | 0 | 0.0 | 4.300 | 0.488 | 86.0 |
| AP_4 | 28 | 35.0 | 50 | 62.5 | 1 | 1.3 | 1 | 1.3 | 0 | 0.0 | 4.312 | 0.565 | 86.3 |
| AP | 33.8% | | 62.8% | | 3.1% | | 0.3% | | 0.0% | | 4.300 | 0.539 | 86.0% |
| | 96.6% | | | | | | 0.3% | | | | | | |

Table (5) shows that the "Active Participation" dimension represented by items AP_1 through AP_4 recorded an agreement rate ("Strongly Agree" and "Agree") of 96.6% among the total sample, while the disagreement rate ("Disagree" and "Strongly Disagree") was 0.3%, and the neutral response rate was 3.1%. These results are supported by a mean score of 4.300, a standard deviation of 0.539, and a response rate of 86.0%. Item AP_2 which states, "I propose new initiatives and ideas and implement them continuously" achieved the highest mean score (4.375), with a standard deviation of 0.537 and a response rate of 87.5%.
a. Analysis of "Feeling the Importance of Work" items:

**Table (6):** Description and analysis of "Feeling the Importance of Work" 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 | % | | | |
| FIW_1 | 20 | 25.0 | 54 | 67.5 | 6 | 7.5 | 0 | 0.0 | 0 | 0.0 | 4.175 | 0.546 | 83.5 |
| FIW_2 | 24 | 30.0 | 52 | 65.0 | 4 | 5.0 | 0 | 0.0 | 0 | 0.0 | 4.250 | 0.540 | 85.0 |
| FIW_3 | 24 | 30.0 | 49 | 61.3 | 7 | 8.7 | 0 | 0.0 | 0 | 0.0 | 4.213 | 0.589 | 84.3 |
| FIW_4 | 30 | 37.5 | 44 | 55.0 | 6 | 7.5 | 0 | 0.0 | 0 | 0.0 | 4.300 | 0.604 | 86.0 |
| FIW | 30.6% | | 62.2% | | 7.2% | | 0.0% | | 0.0% | | 4.235 | 0.570 | 84.7% |
| | 92.8% | | | | | | 0.0% | | | | | | |

Table (6) shows that the dimension "Feeling the Importance of Work" (represented by items FIW_1 through FIW_4) received an agreement rate ("Strongly Agree" and "Agree") of 92.8% among the total sample, while the disagreement rate ("Disagree" and "Strongly Disagree") was 0.0%, and the neutral response rate was 7.2%. These outcomes are supported by a mean of 4.235, a standard deviation of 0.570, and a response rate of 84.7%. Item FIW_4—which states, "I receive sufficient and continuous training to perform the work"—achieved the highest mean score of 4.300, with a standard deviation of 0.604 and a response rate of 86.0%.
a. Analysis of "Belonging" items:

**Table (7):** Description and analysis of "Belonging" 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 | % | | | |
| B_1 | 32 | 40.0 | 44 | 55.0 | 4 | 5.0 | 0 | 0.0 | 0 | 0.0 | 4.350 | 0.576 | 87.0 |
| B_2 | 32 | 40.0 | 44 | 55.0 | 4 | 5.0 | 0 | 0.0 | 0 | 0.0 | 4.350 | 0.576 | 87.0 |
| B_3 | 36 | 45.0 | 40 | 50.0 | 4 | 5.0 | 0 | 0.0 | 0 | 0.0 | 4.400 | 0.587 | 88.0 |
| B_4 | 33 | 41.2 | 44 | 55.0 | 3 | 3.8 | 0 | 0.0 | 0 | 0.0 | 4.375 | 0.560 | 87.5 |
| B | 41.5% | | 53.8% | | 4.7% | | 0.0% | | 0.0% | | 4.369 | 0.575 | 87.4% |
| | 95.3% | | | | | | 0.0% | | | | | | |

Table (7) displays that the "Belonging" dimension is represented by items B_1 through B_4. The agreement rate ("Strongly Agree" and "Agree") reached 95.3% of the total sample, while the disagreement rate ("Disagree" and "Strongly Disagree") was 0.0%, and the neutral response rate was 4.7%. These results are supported by a mean of

4.369, a standard deviation of 0.575, and a response rate of 87.4%. Item B_3 "I feel comfortable with the work team to which I belong" achieved the highest mean score (4.400), with a standard deviation of 0.587 and a response rate of 88.0%.

a. Analysis of Job Satisfaction items:

**Table (8):** Description and analysis of Job Satisfaction 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 | % | | | |
| JS_1 | 26 | 32.5 | 50 | 62.5 | 4 | 5.0 | 0 | 0.0 | 0 | 0.0 | 4.275 | 0.551 | 85.5 |
| JS_2 | 25 | 31.3 | 51 | 63.7 | 4 | 5.0 | 0 | 0.0 | 0 | 0.0 | 4.263 | 0.545 | 85.3 |
| JS_3 | 31 | 38.8 | 45 | 56.2 | 3 | 3.7 | 1 | 1.3 | 0 | 0.0 | 4.325 | 0.612 | 86.5 |
| JS_4 | 30 | 37.5 | 45 | 56.2 | 5 | 6.3 | 0 | 0.0 | 0 | 0.0 | 4.312 | 0.587 | 86.3 |
| JS | 35.0% | | 59.7% | | 5.0% | | 0.3% | | 0.0% | | 4.294 | 0.574 | 85.9% |
| | 94.7% | | | | | | 0.3% | | | | | | |

Table (8) shows that the "Job Satisfaction" dimension represented by items JS_1 through JS_4 received an agreement rate ("Strongly Agree" and "Agree") of 94.7% among the total sample, while the disagreement rate ("Disagree" and "Strongly Disagree") was 0.3%, and the neutral response rate was 5.0%. These results are supported by a mean of 4.294, a standard deviation of 0.574, and a response rate of 85.9%. Item JS_3 which states, "I have noticed an improvement in my job performance since joining the organization"—achieved the highest mean score of 4.325, with a standard deviation of 0.612 and a response rate of 86.5%.

Model Evaluation Metrics

Following the descriptive data analysis, the study model is evaluated using the Partial Least Squares Structural Equation Modeling (PLS-SEM) approach, which is one of the most suitable statistical methods for testing relationships between latent variables. Model evaluation proceeds in two primary stages. The first stage involves evaluating the measurement model, which aims to verify the quality and reliability of measurement instruments by assessing the validity and reliability of the relationships between latent variables and their indicators. The second stage involves evaluating the structural model, which aims to test causal relationships between latent variables, estimate the strength and direction of these relationships, and test the study's hypotheses using Smart-PLS 3 software.

1- Measurement Model Evaluation:

This stage aims to ensure the validity and stability of the variables and indicators within the model. Tables (9) and (10) summarize the reliability metrics for the study's items and dimensions.

**Table (9):** Evaluation criteria for the "Green Transformational Leadership" variable model

| Latent Variables | Items | Outer Loading | | Internal Consistency | | |
|---|---|---|---|---|---|---|
| | | ≥ 0.7 | Remain? | AVE≥0.5 | Cronbach's Alpha ≥0.7 | Composite Reliability ≥0.7 |
| Green Ideal Effect | GIE_1 | 0.822 | Yes | 0.603 | 0.780 | 0.859 |
| | GIE_2 | 0.739 | Yes | | | |
| | GIE_3 | 0.747 | Yes | | | |
| | GIE_4 | 0.796 | Yes | | | |
| Green Inspirational Motivation | GIM_1 | 0.858 | Yes | 0.706 | 0.858 | 0.905 |
| | GIM_2 | 0.883 | Yes | | | |
| | GIM_3 | 0.886 | Yes | | | |
| | GIM_4 | 0.722 | Yes | | | |
| Green Individual Considerations | GIC_1 | 0.788 | Yes | 0.683 | 0.844 | 0.896 |
| | GIC_2 | 0.852 | Yes | | | |
| | GIC_3 | 0.885 | Yes | | | |
| | GIC_4 | 0.777 | Yes | | | |
| Green Intellectual Stimulation | GIS_1 | 0.721 | Yes | 0.582 | 0.759 | 0.848 |
| | GIS_2 | 0.835 | Yes | | | |
| | GIS_3 | 0.728 | Yes | | | |
| | GIS_4 | 0.764 | Yes | | | |
| Green Transformational Leadership | | | | 0.542 | 0.908 | 0.921 |

**Table (10):** Evaluation criteria for the model regarding the "Job Engagement of Employees" variable.

| Latent Variables | Items | Outer Loading | | Internal Consistency | | |
|---|---|---|---|---|---|---|
| | | ≥ 0.7 | Remain? | AVE≥0.5 | Cronbach's Alpha ≥0.7 | Composite Reliability ≥0.7 |
| Active Participation | AP_1 | 0.773 | Yes | 0.676 | 0.839 | 0.893 |
| | AP_2 | 0.838 | Yes | | | |
| | AP_3 | 0.867 | Yes | | | |
| | AP_4 | 0.806 | Yes | | | |
| Feeling the Importance of Work | FIW_1 | 0.810 | Yes | 0.669 | 0.835 | 0.890 |
| | FIW_2 | 0.808 | Yes | | | |
| | FIW_3 | 0.851 | Yes | | | |
| | FIW_4 | 0.803 | Yes | | | |
| Belonging | B_1 | 0.787 | Yes | 0.642 | 0.814 | 0.878 |
| | B_2 | 0.774 | Yes | | | |
| | B_3 | 0.834 | Yes | | | |
| | B_4 | 0.809 | Yes | | | |
| Job Satisfaction | JS_1 | 0.852 | Yes | 0.700 | 0.855 | 0.902 |
| | JS_2 | 0.892 | Yes | | | |
| | JS_3 | 0.879 | Yes | | | |
| | JS_4 | 0.710 | Yes | | | |
| Job Engagement of Employees | | | | 0.544 | 0.915 | 0.927 |

The results presented in Tables (9) and (10) indicate that the validity and reliability requirements for the measurement model have been met. Outer loadings ranged from 0.710 to 0.892, all exceeding the acceptable threshold of 0.70, thereby justifying the retention of all items. Additionally, Average Variance Extracted (AVE) values ranged from 0.542 to 0.706 surpassing the acceptable limit of 0.50 which confirms convergent validity. Cronbach's Alpha values ranged from 0.759 to 0.915, and Composite Reliability values ranged from 0.848 to 0.927; all exceeded 0.70, demonstrating internal consistency and reliability. Consequently, the measurement model satisfies the criteria necessary to proceed to the evaluation of the structural model and the testing of the study hypotheses.

Discriminant validity is a fundamental criterion for evaluating the measurement model; it aims to verify the ability of each latent variable to be distinguished from other latent variables, ensuring that the indicators used to measure a specific variable do not measure a different one. To assess this, the study utilized the Heterotrait- Monotrait Ratio (HTMT), one of the most common criteria for evaluating discriminant validity within the PLS-SEM methodology. Table (11) presents the results of this criterion; all HTMT values fell below the maximum acceptable threshold of 0.90. This confirms the presence of discriminant validity among the study variables, indicating that each latent variable possesses sufficient independence from the others and measures the specific concept it was designed to assess.

**Table (11):** HTMT criterion results

| Latent Variables | GIE | GIM | GIC | GIS | GTL | AP | FIW | B | JS | JEE |
|---|---|---|---|---|---|---|---|---|---|---|
| GIE | — | | | | | | | | | |
| GIM | 0.476 | — | | | | | | | | |
| GIC | 0.717 | 0.692 | — | | | | | | | |
| GIS | 0.804 | 0.559 | 0.791 | — | | | | | | |
| GTL | 0.840 | 0.786 | 0.713 | 0.799 | — | | | | | |
| AP | 0.763 | 0.620 | 0.622 | 0.751 | 0.798 | — | | | | |
| FIW | 0.689 | 0.604 | 0.676 | 0.717 | 0.780 | 0.816 | — | | | |
| B | 0.702 | 0.515 | 0.518 | 0.813 | 0.733 | 0.755 | 0.646 | — | | |
| JS | 0.368 | 0.560 | 0.350 | 0.423 | 0.499 | 0.430 | 0.669 | 0.594 | — | |
| JEE | 0.740 | 0.678 | 0.637 | 0.793 | 0.826 | 0.813 | 0.798 | 0.843 | 0.848 | — |

1- Evaluation of the Structural Model

After confirming that the measurement model meets the criteria for reliability and validity, the process moves to evaluating the structural model. This stage aims to test the hypothesized causal relationships between latent variables and to validate the study hypotheses. The evaluation involves assessing the model's explanatory and predictive capabilities using a set of statistical indicators most notably the coefficient of determination ($R^2$) and effect size ($f^2$) as well as checking for multicollinearity among variables using the Variance Inflation Factor (VIF). The results for these indicators are presented below:

a. Variance Inflation Factor (VIF)

**Table (12):** Variance Inflation Factors

| Items | VIF | Items | VIF | Items | VIF | Items | VIF |
|---|---|---|---|---|---|---|---|
| GIE 1 | 1.750 | GIC 1 | 1.617 | AP 1 | 1.501 | B 1 | 1.876 |
| GIE 2 | 1.443 | GIC 2 | 2.442 | AP 2 | 2.110 | B 2 | 1.821 |
| GIE 3 | 1.468 | GIC 3 | 2.839 | AP 3 | 2.288 | B 3 | 2.123 |
| GIE 4 | 1.586 | GIC 4 | 1.601 | AP 4 | 1.861 | B 4 | 2.000 |
| GIM 1 | 2.491 | GIS 1 | 1.374 | FIW 1 | 1.763 | JS 1 | 2.228 |
| GIM 2 | 2.612 | GIS 2 | 1.861 | FIW 2 | 1.717 | JS 2 | 2.867 |
| GIM 3 | 2.840 | GIS 3 | 1.361 | FIW 3 | 2.069 | JS 3 | 2.646 |
| GIM 4 | 1.410 | GIS 4 | 1.558 | FIW 4 | 1.741 | JS 4 | 1.568 |

Table (12) shows that the Variance Inflation Factor (VIF) values for all study indicators ranged from 1.361 to 2.867. All these values are below the acceptable threshold of 5.00, indicating the absence of a significant multicollinearity issue among the indicators. Consequently, the model satisfies the condition regarding the absence of multicollinearity, allowing for the assessment of relationships within the structural model and the testing of the study hypotheses.

b. Model Quality Assessment

Model quality will be assessed based on both $R^2$ and $F^2$; Table (13) presents the values for these criteria.

**Table (13):** Model Quality Criteria Values

| Latent Variables | $R^2$ | Explanatory Power | $f^2$ | Effect Size |
|---|---|---|---|---|
| GIE | 0.620 | Moderate | 1.630 | Large |
| GIM | 0.571 | Moderate | 1.334 | Large |
| GIC | 0.769 | Substantial | 3.338 | Large |
| GIS | 0.682 | Moderate | 2.144 | Large |
| AP | 0.703 | Moderate | 2.368 | Large |
| FIW | 0.749 | Moderate | 2.978 | Large |
| B | 0.665 | Moderate | 1.981 | Large |
| JS | 0.541 | Moderate | 1.181 | Large |
| JEE | 0.574 | Moderate | 1.349 | Large |

Table (13) shows that the coefficient of determination ($R^2$) values ranged from 0.541 to 0.769, indicating explanatory power ranging from moderate to high. The GIC dimension recorded the highest value (0.769), representing a "substantial" level of explanatory power, while the remaining variables fell within the "moderate" range. Effect size ($f^2$) values ranged from 1.181 to 3.338, all falling within the "large" effect category. Thus, the results indicate that the structural model possesses adequate explanatory power and demonstrates strong effects for the variables included within it.

**Testing Correlation and Influence Hypotheses:**

The study model's fit with the sample data was verified by examining model fit indices and ensuring compliance with required standards. Consequently, we can now proceed to test the study hypotheses outlined in the methodology section, as follows:

**First: Testing Correlation Hypotheses**

To verify the first main hypothesis, the Spearman correlation coefficient was calculated using SPSS 26 software. The results are as follows:

1.Testing the First Main Hypothesis

Here, the first main hypothesis is tested, which states:

"There is no significant correlation between green transformational leadership and employee job engagement in the organization under study."

Table (14) presents the correlation values between Green Transformational Leadership and Employee Job Engagement.

**Table (14):** Correlation Analysis between Green Transformational Leadership and Employee Job Engagement

| Variables | Job Engagement of Employees | | | |
|---|---|---|---|---|
| Green Transformational Leadership | Correlation Coefficient | CI (95%) | | P-Value |
| | | Lower | Upper | |
| | 0.649 | 0.484 | 0.770 | <0.001 |

Table (14) presents the results of the correlation test between Green Transformational Leadership and employee job engagement, using Spearman's correlation coefficient. The results indicate a statistically significant positive correlation between the two variables, with a correlation coefficient of $r = 0.649$ ($p < 0.001$). Furthermore, the 95% confidence interval ranged from 0.484 to 0.770; as this interval does not include zero, the significance of the relationship is confirmed. Consequently, the hypothesis stating that there is a statistically significant correlation between green transformational leadership and employee job engagement within the organization under study is accepted.

1.Testing the sub-hypothesis of the first main hypothesis
Here, the sub-hypothesis of the first main hypothesis is tested, which states:
(There is a significant correlation between dimensions of green transformational leadership (individually) and job engagement of employees (combined) in the researched organization).

Table (15) displays the correlation values between the dimensions of green transformational leadership and the variable of employee job engagement.

**Table (15):** Correlation analysis between the dimensions of green transformational leadership and the variable of employee job engagement

| Variables | Engagement of Employees | | | |
|---|---|---|---|---|
| | Correlation Coefficient | CI (95%) | | P-Value |
| | | Lower | Upper | |
| Green Ideal Effect (GIE) | 0.613 | 0.438 | 0.743 | <0.001 |
| Green Inspirational Motivation (GIM) | 0.485 | 0.285 | 0.644 | <0.001 |
| Green Individual Considerations (GIC) | 0.454 | 0.250 | 0.620 | <0.001 |
| Green Intellectual Stimulation (GIS) | 0.540 | 0.349 | 0.687 | <0.001 |

Table (15) presents the results of the correlation analysis between the dimensions of Green Transformational Leadership and employee job engagement, using Spearman's correlation coefficient. The results revealed statistically significant positive correlations across all dimensions, with coefficients ranging from 0.454 to 0.613 and all p-values below 0.001. Furthermore, none of the 95% confidence intervals included zero. The "Green Ideal Effect" (GIE) dimension showed the strongest correlation with job engagement ($r = 0.613$), while the "Green Individual Considerations" (GIC) dimension showed the weakest ($r = 0.454$). Consequently, the hypotheses are accepted.

**Second: Testing the Influence Hypotheses**

To verify and validate the impact hypotheses, we developed PLS-SEM models using Smart-PLS 3 software to either confirm or refute the hypothesis, as follows:

1.Testing the second main hypothesis, which states:
(There is not a significant effect of green transformational leadership on the job engagement of employees in the researched organization).

Figure (1) illustrates the model diagram for this hypothesis, while Table (16) presents the structural model analysis results, which indicate the accepting of the second main hypothesis.

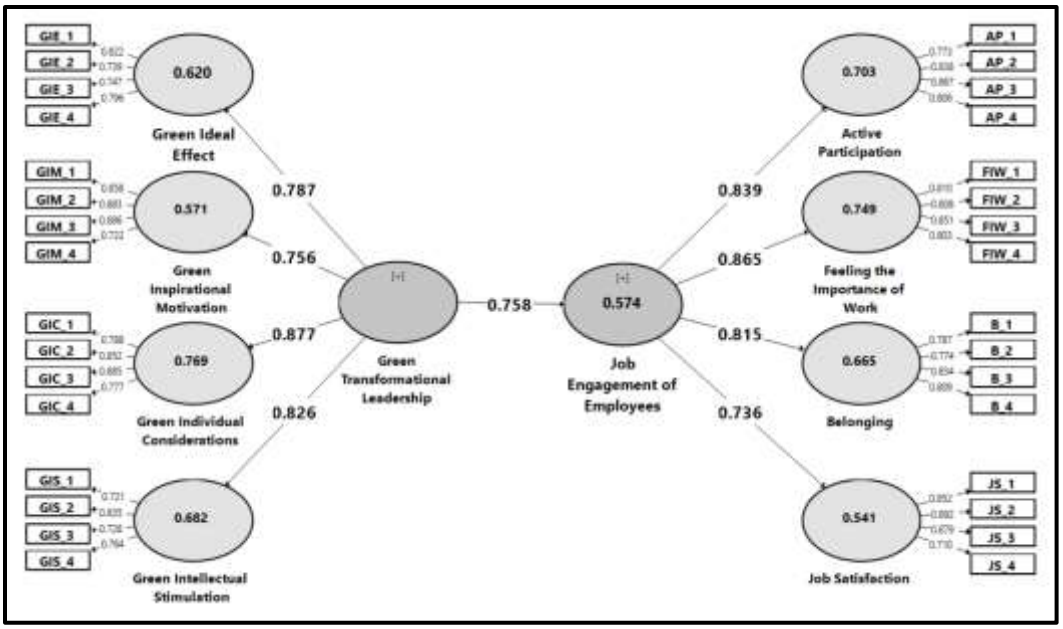



***Figure (1):*** *The effect of green transformational leadership on employee job engagement*

**Table (16):** The effect of green transformational leadership on employee job engagement

| Path | Original Sample (β) | Standard Deviation | T Statistic | P-Value | CI (95%) | | $R^2$ |
|---|---|---|---|---|---|---|---|
| | | | | | Lower | Upper | |
| GTL →JEE | 0.758 | 0.058 | 13.02 | <0.001 | 0.633 | 0.856 | 0.574 |

Table (16) demonstrates a positive and statistically significant effect of Green Transformational Leadership (GTL) on Employee Job Engagement (JEE), with a path coefficient of β = 0.758, a T-value of 13.020, and a significance level of $p < 0.001$. Furthermore, the 95% confidence interval ranged from 0.633 to 0.856 and did not include zero, confirming the significance of the effect. The coefficient of determination ($R^2$) was 0.574, indicating that Green Transformational Leadership explains 57.4% of the variance in employee job engagement. Consequently, the hypothesis positing a statistically significant effect of Green Transformational Leadership on employee job engagement is accepted.

1.Testing the sub-hypothesis of the second main hypothesis, which states:
(There is a significant effect of the dimensions of green transformational leadership (individually) on the job engagement of employees (combined) in the researched organization).

Figure (2) presents the model diagram for this hypothesis, while Table (17) displays the results of the test regarding the effects of Green Transformational Leadership dimensions on employee job engagement.

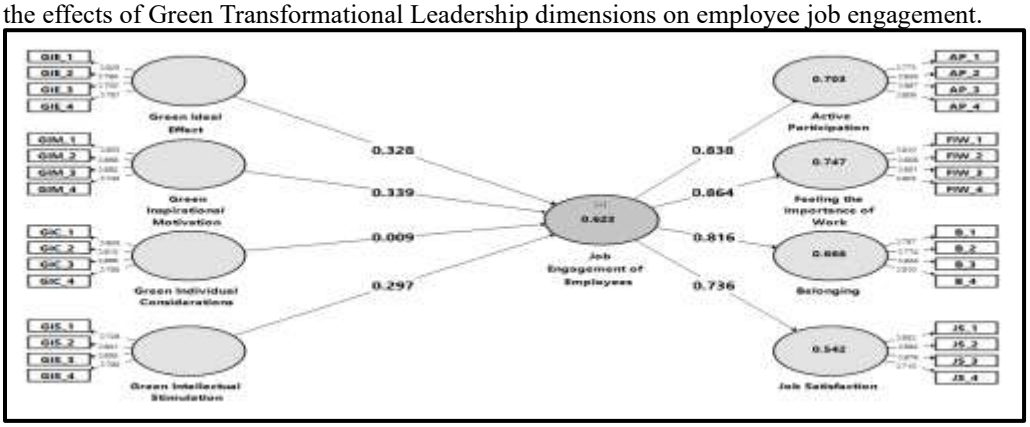



***Figure (2):*** *The impact of green transformational leadership dimensions on employee job engagement*

**Table (17):** The impact of green transformational leadership dimensions on employee job engagement

| Path | Original Sample (β) | Standard Deviation | T Statistic | P-Value | CI (95%) | | $R^2$ |
|---|---|---|---|---|---|---|---|
| | | | | | Lower | Upper | |
| GIE →JEE | 0.328 | 0.105 | 3.133 | 0.002 | 0.110 | 0.517 | 0.623 |
| GIM →JEE | 0.339 | 0.103 | 3.295 | 0.001 | 0.126 | 0.530 | |
| GIC →JEE | 0.009 | 0.127 | 0.074 | 0.941 | -0.222 | 0.265 | |
| GIS →JEE | 0.297 | 0.127 | 2.344 | 0.019 | 0.050 | 0.537 | |

Table (17) presents the results of testing the impact of green transformational leadership dimensions on employee work engagement when all four dimensions are included in the model. The results revealed a positive and statistically significant effect for the Green Ideal Effect (GIE) dimension (β = 0.328, p = 0.002), the Green Inspirational Motivation (GIM) dimension (β = 0.339, p = 0.001), and the Green Intellectual Stimulation (GIS) dimension (β = 0.297, p = 0.019); notably, the confidence intervals for these effects did not include zero. In contrast, the Green Individual Considerations (GIC) dimension did not show a statistically significant effect on work engagement, with a path coefficient of β = 0.009 and a significance level of p = 0.941, and its confidence interval included zero.

The results indicate that the Green Inspirational Motivation (GIM) dimension had the greatest relative impact, followed by Green Ideal Effect (GIE) and then Green Intellectual Stimulation (GIS), whereas Green Individual Considerations (GIC) did not provide an independent explanatory contribution to work engagement when the other dimensions were present in the model. The coefficient of determination ($R^2$) was 0.623, meaning that the green transformational leadership dimensions collectively explain 62.3% of the variance in employee work engagement. Consequently, the null hypothesis is rejected for the GIE, GIM, and GIS dimensions but not for the GIC dimension, indicating that the alternative hypothesis is partially supported.

**Conclusions and Discussion:**

The results noted in this study highlighted the positive relationship between green transformational leadership and job engagement of employees. It was also noted that green transformational leadership has a positive effect on job engagement of employees.
There is limited empirical evidence regarding the relationship between green transformational leadership and job engagement of employees. Very few studies were examined this relationship, as Gao and Yue (2026) have investigated the impact of green leadership on employee work engagement and green behaviour: the mediating role of green organizational culture.

This was one of the first studies that attempted to investigate these variables in the Nineveh Education Directorate. Hence, the results of this study could fill the gap existing in the empirical data regarding green transformational leadership. In this study, the researchers used green transformational leadership as an independent variable, while the earlier studies considered green transformational leadership as the independent variable Kaya and Atsan, (2025) have investigated the influence green transformational leadership on employee green behavior with the mediating role of green intrinsic motivation and the study of Gao and Yue (2026).

Currently, job engagement of employees is achieved through green transformational leadership by setting an environmental example. This approach not only fosters employee motivation and inspiration but also links that motivation to the organization's sustainable environmental goals. In this study, the researchers have investigated the relationship between the green transformational leadership and job engagement of employees. Here, the data has offered empirical support which highlighted the effect of green transformational leadership on job engagement of employee. Further research could provide a better understanding and support for the effect of green transformational leadership on job engagement of employees.

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