

The Influence of Environmental Leadership and the Locus of Control on the Application of Green Concrete

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The objective of this research is to find out the effect of environmental leadership and the locus of control on the application of green concrete. An ex post facto method has been used by selecting 24 samples for each cell. The reliability of environmental leadership was .792, the locus of control was .86 and green concrete was .89. The data was analysed by a two-way ANOVA. Research results revealed that there was Green concrete with significant differences between those employers who have employee environmental leadership transformational compared to employee environmental leadership transactional. Moreover, there was a significant interaction between environmental leadership and the locus of control on the application of Green concrete. It could be concluded that the management who perceived environmental leadership as transactional was not always more effective when compared to employee environmental leadership. When it comes to affecting 'greener' employment, it depends on mostly internal or external locus of control.

Keywords: *Environmental leadership, locus of control, and Green concrete.*

Introduction

Putrawan stated that in order to utilise the natural resources and ecosystem rationally, it takes human effort to conserve biodiversity and strive to avoid damage by practicing the rules, laws, and policies that are environmentally friendly (*environmentally*) and sustainability (*sustainability*). This will work effectively if done by institutions that care about the environment (*green institutions*). Thus, the magnitude of the influence of the government or organisation in the success of *green concrete* will be explored. This can be realised with the

enactment of regulations and policies as well as strict sanctions that deter the management of infrastructure development that does not care about environmental sustainability.

According to Brenda & Robert Vale (1991), green architecture is a building design approach that focuses on natural resources used in building materials, fuel during construction, and the role of the building. Vale added that green architecture is not a concept that must be followed, but is useful as a reminder so that the architectural actors do not ignore this concept. Green architecture is a form of architecture that consumes minimal natural resources, including energy, water, and materials, that minimises negative environmental impacts (Harsono, 2010).

According to Siregar in Iswanto's research (2012), green architecture is an architectural work to preserve nature and the environment by prioritising energy efficiency. In the world of architecture, the phenomenon of *sick building syndrome* emerges. This involves health problems and discomfort due to air quality and air pollution in buildings that affect occupant productivity, poor air ventilation, and poor natural lighting. This is caused by several things, for example: photocopy machine ozone emissions, pollution from furniture and wood panels, cigarette smoke, etc. The World Health Organisation (WHO), states that 30% of buildings in the world experience indoor air quality problems.

Architects aim to change the forests, agricultural lands, swamps, and green space into housing and cities. From the architect's hands, it is determined whether a building is designed to be energy efficient, or relies on the consumption of fossil fuels and emits large amounts of CO₂ and causes global warming. For this reason, the concept of green architecture is an architectural planning approach that seeks to minimise various harmful effects on human health and the environment.

The concept of green architecture has several benefits including a more durable building, energy saving, minimal maintenance, more comfortable to live in, and healthier for residents. The concept of green architecture contributes to environmental problems, especially global warming. The Green Architectural Measurement Standards are as follows:

a. BREEAM (*Building Research Establishment Method*)

Green level standardisation and assessment of a building began in the UK in 1990 when the government-owned building research institute, *Building Research and Establishment* (BRE) formulated a standard called the *Building Research and Establishment's Environmental Assessment Method* (BREEAM). BREEAM is the oldest, most complete, and most detailed green level reference assessment in the world. The parameters assessed by BREEAM include 10 aspects, namely management, health and quality of life, energy, transportation, water, materials, waste, land use and ecology, pollution, and innovation.

- b. LEED (*Leadership in Energy and Environmental Design*) *Leadership in Energy and Environmental Design* (LEED) was initiated by the *United States Green Building Council* (USGBC) in 1998. It developed the concept of BREEAM standards for a more practical application. Yardstick used LEED to rate the level of green building or the built environment and the sustainability of the site (*sustainable site*), water savings (*water efficiency*), energy and atmosphere (*energy and atmosphere*), materials and resources (*material and resource*), quality in the space environment (*indoor environmental quality*), innovation and design processes (*innovation and design process*).
- c. *Greenship* (Indonesian Green Building Standard)
Greenship is a green building standard developed by the Indonesian *Green Building Council* or the *Green Building Council of Indonesia* (GBCI). The GBCI institution was formed by the non-government sector, although in its development it was later supported by a number of government agencies in Indonesia. GBC Indonesia compiles green building standards that are enforced in Indonesia as *Greenship*. There are seven aspects assessed in the *Greenship* standard, namely, the accuracy of site development (*appropriate site development*), water saving (*energy efficiency and conservation*), material resources and recycling (*material resource and cycle*), *indoor health and comfort* (*indoor health and comfort*), the environmental conditions of buildings and building management (*building environment and management*).

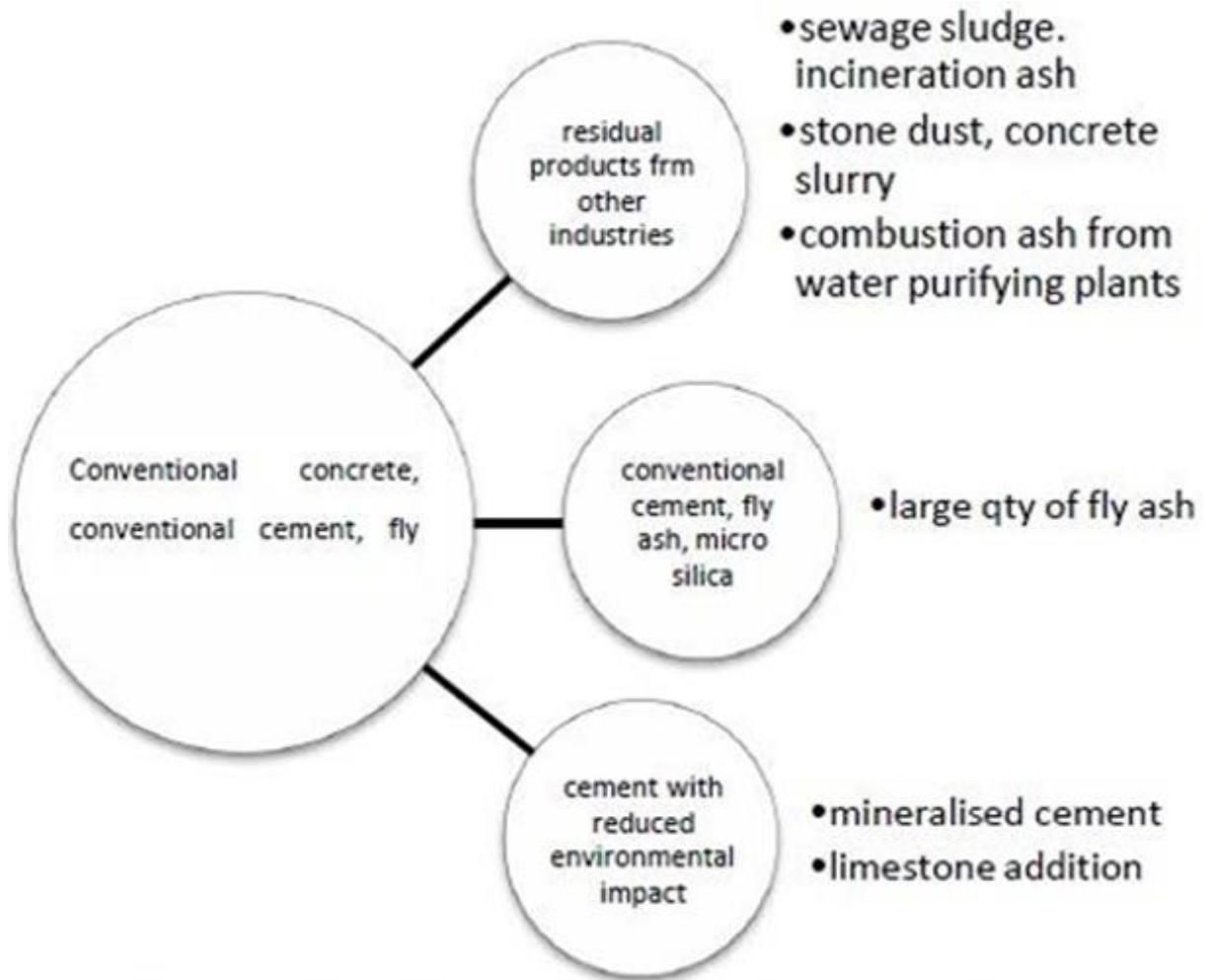
Literature Review

Green concrete

The size of the construction industry throughout the world is growing at a fast rate. The large construction growth drives demand for building materials. Aggregate is the main element of concrete. Because it is continuously mined, the availability of aggregates has caused problems in recent times. To overcome this problem, it is necessary to find a replacement to a certain extent. At present, there is a solution which is known as "Green Concrete". Green concrete has nothing to do with colour, rather, this is an environmental concept. The formulation of concrete must consider every aspect of manufacturing raw materials more than a mixture design for structural design, construction, and service life. Green concrete is also inexpensive to produce because waste products are used as partial replacements for cement, costs for disposal are avoided, energy consumption in production is lower, and durability is greater. Waste can be used to produce new products or can be used as a mixture so that natural resources are used more efficiently and the environment is protected from sewage sludge (Baikerikar, 2014).



The potential environmental benefits for the community to be able to build with green concrete is huge. It is realistic to assume that technology can be developed, which can halve the CO₂ emissions associated with concrete production. With this large concrete consumption has the potential to reduce total world CO₂ emissions by 1.5-2%. Concrete can also be a solution for environmental problems other than those related to CO₂ emissions. It is possible to use residual products from other industries in concrete production while maintaining high quality concrete. Over the last few decades people have become aware of deposit problems related to residual products, and demands, restrictions, and taxes have been imposed. It is known that some residual products have suitable properties for concrete production and there is great potential in investigating the possibility of their use for concrete production. Well-known residual products such as silica fume and fly ash must be mentioned. The concrete industry realised at an early stage that it was a good idea to be ahead with regard to documenting actual environmental impacts and working on improving the environment, rather than being forced to deal with environmental issues due to demands from the authorities, customers, and the economic effects such as taxes imposed. In addition, several companies in the concrete industry have recognised that the reduction in production costs often goes hand in hand with a reduction in environmental impact. Thus, environmental aspects are not only interesting from an ideological point of view, but also from an economic perspective.



Replacement Materials For Green Concrete

Sl. No	Traditional Ingredients	Replacement Materials for Green Concrete
1.	Cement	Eco-Cement, Sludge Ash, Municipal Solid Waste Fly Ash
2.	Coarse Aggregates	Recycled Aggregates, Waste Ready Mix Concrete, Waste Glass, Recycled Aggregates with Crushed Glass, Recycled Aggregates With Silica Fume.
3.	Fine Aggregates	Fine Recycled Aggregate, Demolished Brick Waste, Quarry Dust, Waste Glass Powder, Marble Sludge Powder, Rock Dust and Pebbles, Artificial Sand, Waste Glass, Fly Ash And Micro Silica, Bottom Ash of Municipal Solid Waste



Leadership

Rondinelli, (1998) quoted from Atzori et al (2012), stated that there are four forces related to the response to environmental issues in the green movement (*going green*). These forces include compliance with regulations (*regulatory compliance*), pressure from stakeholders (*stakeholder pressure*), economic motivation (*economic motives*) and ethical concerns. Fulfillment of regulations involves the application of regulatory and policy instruments aimed at influencing the behaviour of parties who are regulated to comply with these instruments. Although, on the other hand, it is an element that is not easy to implement because it involves many parties. The intention is to fulfill government regulations, the stages include socialisation, monitoring, and enforcement.

It is through the understanding of ethical values and how leader stakeholders should provide a solution to inculcate the culture of the green movement (*going green*) in the values (*values*) and ethics (*ethics*) (Leverett 2014).

Research conducted by Robertson and Barling (2013) states that *greening* organisations occurs through the influence of leaders on the behaviour of pro-environment employees. The findings of this research indicate that environmental leaders describe norms, leadership, and pro-environmental behaviour as factors that play an important role in *greening* the organisation. Ugur Yozgata and Nilgun Karatas, (2011) found that most companies are sensitive and responsive to the environment, emphasising energy and resource-saving products, and the importance of green responsibilities and the availability of natural resources to ensure that current activities do not threaten the world of the future (*sustainable development*).

Leadership (*leadership*) is always associated in nature (*traits*), behavioural (*behaviours*), influence (*influence*), patterns of interaction (*interaction patterns*), the relationship role (*role-relationship*), transformational leadership, and staff relations. Regarding the integration model and the behaviour of organisations or institutions, according to Colquit et al, (2011), leadership and employees as individuals can be assessed on individual merit (*individual outcomes*). This can be done by assessing performance of the job (*job performance*) or behaviours that contribute to good or bad and commitment to the organisation (*organizational performance*) ie strong or weak individual desires in the organisation.

According to Yukl (2010) leadership is "the ability of an individual to influence, motivate, and enable others to contribute towards the effectiveness and success of the organisation". Leadership is the ability of individuals to influence, motivate, and allow others to contribute to the success and effectiveness of an organisation. Ivancevich et. al. (2014)



leadership is " the process of influencing others to facilitate the attainment of organisationally relevant goals".

There are four characteristics of leadership to achieve organisational goals: (1) tutorial (*direction*) and sense (*meaning*) to the employees, (2) build confidence (*trust*), (3) support activities (*favour action*), risk (*risk taking*), and (4) giving hope . The quality of leadership becomes important in one situation which may be different to what is needed in another situation. The leadership approach emphasises the exchange process. Employees are rewarded by leaders when organisational goals are achieved and leaders serve to help employees complete their goals.

Mullins (2010) defines leadership as "a relationship through which one person influences the behavior or actions of other people". Leadership is a relationship through which a person influences the behaviour or actions of others. The leadership process will depend on the activities of a group of people and the effectiveness of building a group of people.

Leadership is always present in every group of people related to work. Leadership is not always interpreted as a command (*command*) or supervision (*control*), but rather on the concept of group and relationships with people which inspire and build a vision that others can understand. An institutional leader must focus on the movement of people and the progress of the institution by developing staff competency (*the competency of staff*) and teamwork (*teamwork*) in order to develop the institution (Mullins, 2010) . Therefore, leaders interpret relationships with subordinates, providing a clear organisational vision and mission information to other employees for organisational purposes.

Leadership (*leadership*) is a method or way in which leadership functions are carried out or the methods and ways in which managers behave towards employees of an organisation. Leadership affects the organisation in several ways, namely, (1) increasing business competitiveness and knowledge of human resource efficiency, (2) changes in the value system of society, (3) expansion of education and training standards, (4) improvement in the field of science and technical knowledge, (5) changes in the work organisation environment, (6) emphasis on social responsibility to employees, (7) government regulations.

Locus of Control

The concept of the locus of control (*locus of control*) was first proposed by Rotter (YEAR), an expert on social learning theory (*Social Learning Theory*). The locus of control "is one of the personality variables that is defined as an individual's belief in the ability to control one's own *destiny* " (Rotter, 1996) . Individuals who have the belief that fate or events in their lives are under their control are said to be individuals who have an internal locus of

control. Meanwhile, individuals who have the belief that the environment has control over their fate or events that occur in their lives are said to be individuals who have an external locus of control.

Ali Farazmand (2012) explained the *locus of control* as:

Rotter posited that the locus of control has two dimensions. Internal locus of control suggests that people believe reinforcements are dependent on their actions; consequently, people are able to shape their existence and future. External locus of control suggests that people believe reinforcement is independent of their actions, thus their future is more determined by chance than direct personal interventions. Farazmand (2012)

Therefore, according to Rotter, the locus of control has two dimensions. Internal locus of control, that is, people believe that power is bound to one's own actions, such as consequences, people can change their existence and future. External locus of control involves people believe that power is not bound to one's own actions, meaning that the future is determined more by chance than by direct influence on oneself.

In the book *Psychiatric And Mental Health Nursing For Canadian Practice* authors Wendy Austin and Mary Ann Boyd (2010) explain that:

Rotter, a social learning theorist, proposed that there are two dimensions of locus of internal and external control. Individuals with an internal locus of control believe that they can influence the outcome of events in the world. They accept that they are responsible for their behaviour, appraise situations rationally, and choose a course of action that will have favorable consequences. By contrast, individuals who have an external locus of control believe that their fate is under the control of some external agents (eg, fate, luck, authority figures). (Austin and Boyd, 2010)

Locus of control is how an individual feels/sees the line/relationship between their behaviour and its effects, whether they can accept responsibility or not for their actions. Locus of control has external and internal dimensions. The external dimension will assume that the responsibility for all those actions is outside of the doer. Whereas the internal dimension sees that the responsibility for all actions lies with the perpetrator.

Thus, the Center of Control (*Locus of Control*) is how individuals believe that power is bound to their actions, such as consequences, and whether a person can accept responsibility for their actions. The Control Center (*Locus of Control*) has two dimensions, namely, the Internal Control Center (Internal locus of control) and the External Control Center (*External*

Locus of Control). The external dimension will assume that the responsibility for all those actions is outside of the doer. Whereas the internal dimension sees that the responsibility for all actions lies with the perpetrator. According to Walker, et.al (2007)t:

Rotter (1966) is well known for the development of the first locus of control (LOC) measurement scale, which placed beliefs about control on a single bipolar dimension: internal versus external. Internal LOC refers to the belief that I am responsible for the things that happen to me. External LOC refers to the belief that things that happen to me are a consequence of luck, fate, chance or someone else.

Research Methods

This research was conducted using a quantitative approach through survey methods and *expost facto* techniques with 2x2 design adapted from John W. Best (2010). This study examines the relationship between research variables, as well as measuring the influence of one variable with another variable. In this study there are three studied variables, namely: green concrete as the dependent variable (Y). While the independent variables are (1) environmental leadership (A), which consists of transformational environmental leadership (A₁) and transactional environmental leadership (A₂); (2) internal locus of control (B₁) and external locus of control (B₂) (Uma Sekaran and Roger Bougie, 2010). With the design in this study depicted in Table 1 as follows:

Table 1: Research design

		Environmental leadership (A)	
		Transformational (A ₁)	Transactional (A ₂)
Locus of control (B)	Internal (B ₁)	A ₁ B ₁	A ₂ B ₁
	external (B ₂)	A ₁ B ₂	A ₂ B ₂

Information

A: Environmental Leadership

A₁ : Transformational Environmental leadership

A₂ : Transactional Environmental leadership

B: Locus of control

B₁ : Internal locus of control

B₂ : External locus of control

A₁B₁ : Employee Group on assessing the environmental leadership of transformational with locus of internal control Group

A₂B₁ : Employee Group on assessing the environmental leadership Of transactional with locus of internal control Group

A₁B₂ : Employee Group on assessing the environmental leadership of the transformational with the locus of control external Group

A₂B₂ : Employee Group on assessing the Environmental leadership of transactional with the locus of control external group

The population in this study were all employees of the Perusahaan Konturksi di DKI Jakarta. The sampling procedure used was multistage random sampling in which case the DKI Jakarta was chosen by purposive sampling. Given the disproportionate distribution of employees, a sampling area was used by appointment of three construction company that have the task of implementing green concrete policies, namely the Adhi Karya (Persero) Tbk, Pt Acset Indonusa Tbk, and Darma HenwaTbk.

Furthermore, employees as individual units are determined as respondents. The employees are selected by *simple random sampling* of 210 employees as samples. Data collection is done by the *Door to Door* technique . Scores obtained for Environmental leadership are then ranked or ranked from highest to lowest score, then taken 27% *Upper group* which is a group that is considered to have employees with High Environmental leadership, and the *lower group* with Employee who assess environmental leadership. Therefore, there are 57 employees being sampled.

Based on the Employee environmental leadership , the respective employee locus of control scores can be included for the High Employee who assess environmental leadership transformational group (A₁) and the Employee who assess environmental leadership transformational (A₂). The next step is to rank employee locus of control again to score on a first and on a second , then obtained 27% for locus of control internal (B₁) and eksternal (B₂), good for groups A₁ and A₂. Of each employee's name, it can be included that scores of *green concrete employees* made up 57 samples, so any *cell* represented by 15 employees. Each cell is discarded 1, which in turn each cell is selected as many as 14 employees as a sample by means of *simple random sampling* .

Results and Discussion

The research hypothesis testing was carried out by analysis of variance 2 paths (two path ANAVA) for the first, second and fifth hypotheses. For the third and fourth hypotheses, two groups were tested using the Tukey test. The results of the two-way ANAVA calculation are presented in the following table:

Table 2: Calculation results for ANAVA 2 Lane

Source of Variance	df	SS	MS	F _{count}	F _{table}		
					$\alpha = 0,05$	$\alpha = 0,01$	$\alpha = 0,001$
Between groups	3	15670,05	5223,3	32,875**	2,95	4,57	7,19
In Group	52	8262,071	158,88				
Environmental Leadership (A)	1	9386	9386	59,075**	4,16	7,53	13,29
Locus of Control (B)	1	2619,4	2619,4	16,49**			
AXB Interaction	1	3664,4	3664,4	23,063**			
Total	56	1298675					

^{ns} = non Significant

* = Significant

** = Very Significant

From the data above, it was found that there was an interaction, so the third and fourth hypothesis testing continued with the Tukey test , with the following results:

Table 3: Tukey test results

The group being compared	Q count	Q table $\alpha = 0.05$
A1B1 with A2B1	28,76	3.77
A1B2 with A2B2	6,13	3.77

Based on the calculation results contained in table 2 and table 3 above, it can be formulated as a result of the hypothesis test as follows:

1. The First Hypothesis is the difference in green concrete between employees with transactional and transactional environmental leadership.

From the calculation of ANAVA, with the reject H₁ criteria if the F_{count} > F_{table} at the significance level $\alpha = 0.001$, it is known that the F_{count} = 59.075 > F_{table} = 13.29 at the significance level $\alpha = 0.001$. Thus, H₀ is rejected and H₁ accepted. Based on this, the hypothesis proposed by the researchers can be accepted that there are significant differences between green concrete differences and between employees of transitional and transactional environmental leadership.

2. The Second Hypothesis is the difference in green concrete between employees with internal and external locus of control

From the calculation of ANAVA, with the rejection of the criteria H₀ if the F calculated value > F_{table} at the significance level $\alpha = 0.05$ it is known that the F_{count} = 16.49 > F_{table} = 13.29 at the significance level $\alpha = 0.05$. Thus, H₀ is rejected and H₁ accepted. Based on this,

the hypothesis proposed by researchers can be accepted that there are significant differences in green concrete between employees with internal and external locus of control.

3. The Third Hypothesis states that there are employees with the internal locus of control, green concrete employees with transformational environmental leadership are higher than those with environmental leadership transactional employees.

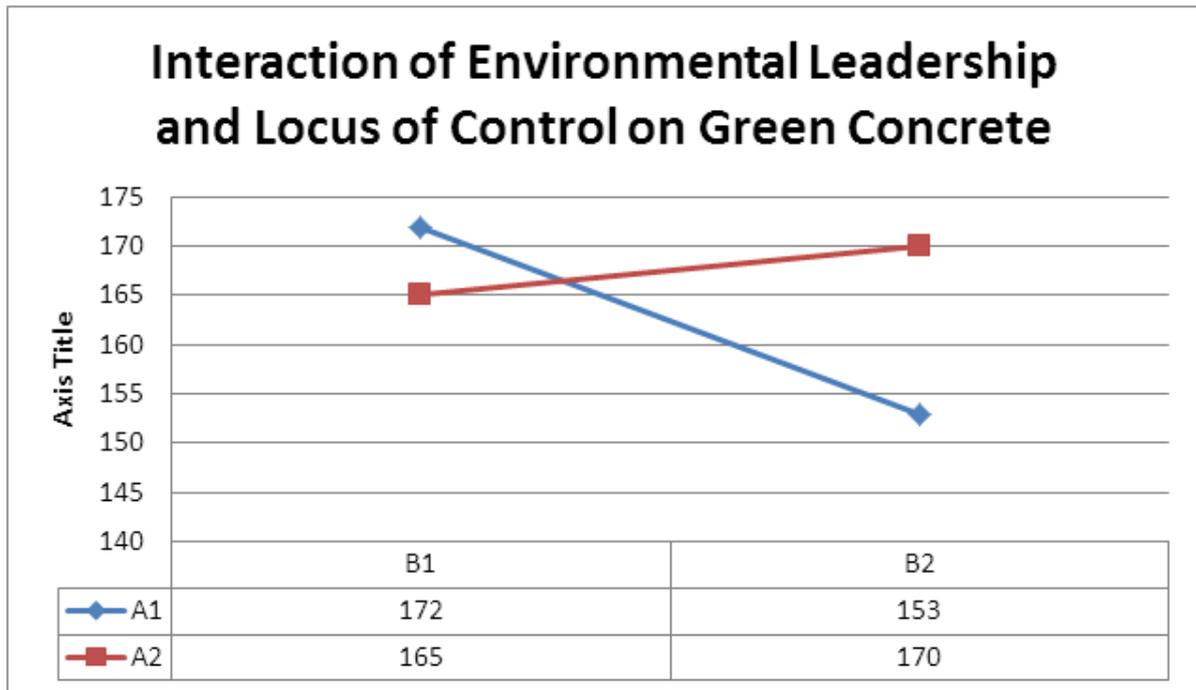
From the results of the calculation of the mean score of the A1B1 group = 172 and the mean score of A2B1 = 165 it can be seen that there are differences in the score of green concrete. Then after testing the significance level of difference using the Tukey test with H_0 rejected testing criteria if the $Q_{count} > Q_{table}$ at a significance level $\alpha = 0.05$. It is known that the $Q_{count} = 28.76$ while the $Q_{table} = 3.77$. Thus H_1 is accepted and there is a significant difference between the scores p there are employees with the locus of internal control, green concrete employees with an environmental transformational leadership employee is higher than the employee with transactional environmental leadership.

4. The Fourth Hypothesis states that there are employees with an external locus of control, green concrete employees with transformational leadership environmental employees are lower than employees with transactional environmental leadership.

From the results of the calculation of the mean score of the A1B2 group = 153 and the mean score of A2B2 = 170, it can be seen that there are differences in the score of green concrete. Then after testing the significance level of difference using the Tukey test with H_0 rejected testing criteria if the $Q_{count} > Q_{table}$ at a significance level $\alpha = 0.05$. It is known that the $Q_{count} = 6.13$ while the $Q_{table} = 3.77$. Thus H_0 is accepted and there are no significant differences between the scores p there are employees with external locus of control, green concrete employees with an environmental transformational leadership than the employees with the environmental transactional leadership.

5. The Fifth Hypothesis is the effect of interaction between environmental leadership and locus of control of green concrete

From the ANAVA calculation, with the rejected criteria H_0 if the F is calculated $> F_{table}$ at the significance level $\alpha = 0.05$ it is known that the calculated F value = $23.06 > F_{table} = 4.06$ at the significance level $\alpha = 0.05$, thus, H_0 is rejected and H_1 accepted. Based on this, the hypothesis proposed by researchers can be accepted that there is an influence of interaction between environmental leadership and locus of control of green concrete.



Conclusion

According to the results, it can be concluded that there are differences between green concrete and environmental leadership and the locus of control demonstrates differences between green concrete, whose employees have environmental leadership transformational and transactional. There is a difference between cities with locus of control internal and external. There are also employees' perceptions of green concrete that are not affected by environmental leadership, but by locus of control (internal and external).



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