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Developing a behavioural green index (BGI): introduce a framework and changing behaviour

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Abstract. Some humans are the cause of environmental damage. Employee Green Behaviours must be able to maintain environmental quality because the construction industry is a contributor to high environmental damage in the world. Integrated control is needed in developing green behavioural awareness especially for human resources involved in building and housing projects. The purpose of this study is to develop a conceptual framework towards Behavioural Green Index (BGI) in construction. The methodology developed using frameworks studies and factors analysis. Factor analysis is carried out on factors that have been found to have influence on green behaviour such as external factors and internal factors. The results of this study is conceptual framework as inputs for developing a BGI that needs to be followed up by increasing green behaviour, reducing behavioural barriers, and supporting habitability.

1. Introduction

Kollmuss and Agyeman [37] concludes that many theoretical frameworks have been developed to explain the gap between environmental knowledge, environmental awareness and green behaviour.



Table 1. Research gap for green behaviour frameworks.

Frameworks	Factors	Research Gap
Early Models of pro-environment behaviour [11]	Environmental knowledge, environmental attitude and pro-environmental behaviour	There are commonalities, contradictions and omissions in the form of a framework. Some models have the same factors. Some models have contradictions in terms of perspective. Some models can be seen as complementary to one another. This study proposes a green behavior conceptual framework with the principle: a. the framework is structured based on a combination of existing frameworks b. the framework uses factors that have been found and adds to other literature for factors that do not yet exist in the framework c. the framework is integration from previous studies frameworks d. the framework is intended to obtain measurement and assessment of a construction project based on human capital
Theory of reasoned action [2]	Evaluative beliefs, normative beliefs, motivation to comply, attitude toward behaviour, relative importance of attitudinal and normative considerations, subjective norm, behaviour intention, behavior	
Models of predictors of environmental behaviour [31]	Personality factors (Attitudes, locus of control and personal responsibility), knowledge of issues, knowledge of action strategies and action skills (intention to act), situational factors, pro-environmental behavior	
Model of ecological behaviour [24]	Possibilities to act pro-environmentally, incentives for pro-environmental behaviour, perceived consequences of behaviour, environmental knowledge, environmental attitudes and values, pro-environmental behavior	
Barriers between environmental concern and action [6]	Type of barrier (individual barrier, individual in social context, social/institutional barriers), environmental concern, individuality, responsibility, practicality, pro-environmental behavior	
Model of pro-environmental behaviour [37]	Internal factors (knowledge, feeling, values attitudes), external factors (infrastructure, political, social and cultural factors economic situation etc, pro-environmental behavior	

2. Theoretical study

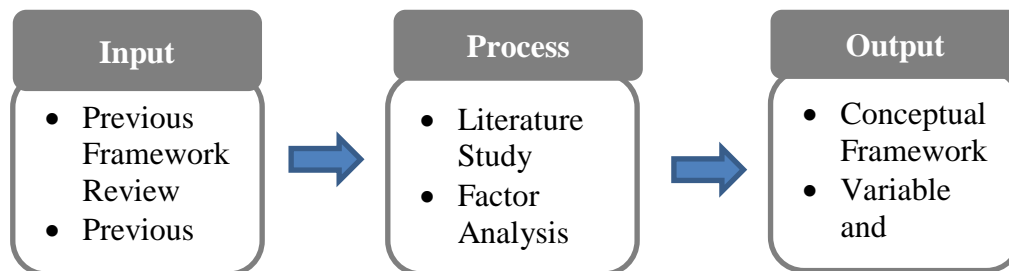
Kollmuss and Agyeman [37] suggested that there are three factors important in green behaviour such as demographics, external factors and internal factors.

Table 2. The three factors important in green behaviour.

	Theory	Research Study
Green Behaviour (green behaviour performance) [45,46,47]	planned behaviour [2,57], risk, construction management [55], fundamental causes, construction economic, microeconomics, decision making process, psychology	How to make green behaviour on rational preferences, maximise outcomes and act independently to measure behaviour risk and root cases on construction project that can influence ecology based [15,16,37,60,61]
External Factors (green behaviour policy)	Sociological [27], infrastructure, economic [1], social culture [7], institutional	How to measure external factors that impact to behavioural change [33,63]. The green habitability is a enabler [23]
Internal Factors (green behaviour competency)	Motivation [40] [53], environmental knowledge [18,26,30,34,35], values [27,36,13,14], attitudes [44] [18,36], environmental awareness [53], perception of control [3,9,44], emotional involvement [13,14,30,36]	How to make green competency and to measure barrier behaviour , mental shortcut, emotional [25,28,29,51] [41,57]. Demographics is part of Internal Factors [64]

3. Methodology

Research methods used in this study using literature studies and factors analysis in the field of green behaviour, as illustrated in the **Figure 1** below.

**Figure 1.** Research methodology.

4. Analysis

4.1. External factors or green habitability (Green behaviour policy)

Environmental policy is the commitment of an organization or government to the laws, regulations, and other policy mechanisms concerning environmental issue [19,20,21,65]. Lauritzen [39] state, “To be ecologically sustainable, we need to promote, influence, and change employee behaviors such that they are congruent with environmental sustainability goals of organizations”. Employee Green Behaviours (EGBs) is scalable actions to contribute in environmental sustainability [40]. Policies relating to environmental impacts must touch the practical level in terms of the EGBs. Construction companies need to provide rules regarding green behavior on the project site. [42] suggested that company must propose a new company policy with addressing the environmental impact of the policy

such as buy company supplies with thought for environmental impact, prioritize actions that would benefit the environment, reduce water consumption by turning off faucets when not in use, use inefficient work processes that waste natural resources and monitor the environmental impact of workplace processes.

4.2. Green behaviour performance (Green performance capability)

Lauritzen [39] suggested that behaviors can be counterproductive in that they actually detract from the organization's environmental performance. Green Performance factor are the working sustainably, avoiding harm, influencing others, conserving and taking initiative factors [57]. Meaningful outcomes could include performance of EGBs [12]. These behaviors can be performed as part of an employee's job duties and outside of an employee's job duties as organizational citizenship behaviors. Opposes the use of unethical practices to increase performance. Is fair and objective when evaluating EGBs performance and providing rewards. As a result all levels of employees must demonstrate the green behavior in their organizations and thrive for success. According to [8] initiatives made by employees have a significant impact on greening the organizations apart from the initiatives taken by the formal management systems, procedures or technologies. As a result of intensifying concern about green activities; a growing body of literature has been concerned with the motivation for adopting environmentally related standards and their impact on firms' performances, role of green psychological climate, organizational sustainability and employee green behavior [38,45,47]. EGBs can be part of any dimension of job performance and can be either required or discretionary, depending on the nature of the job [12].

According to [45] required EGB is delineated as green behavior performed within the context of employees' required job duties. Required EGB is also known as task related EGB which includes obliging to organizational policies, changing methods of work and creating sustainable products and processes [45]. The concept of required EGB is similar to task performance [45] which is defined as the activities formally identified as a part of the job of a person that contributes to the technical core of an organization [10]. Voluntary EGB has been defined as "green behavior involving personal initiative that exceeds organizational expectations" [45].

4.3. Internal factors or green barrier behaviour (Green competency)

[37] concluded that internal factors are motivation, environmental knowledge, values, attitudes, environmental awareness, emotional involvement, locus of control, responsibility and priorities. Recently human resources management functions such as recruitment, selection, training and performance evaluation are expected in considering environmental management issues [64]. Environmental protective acts with adequate ecological knowledge [62] and socio-economic behavior and skills are referred to in this paper as green competencies [32,42].

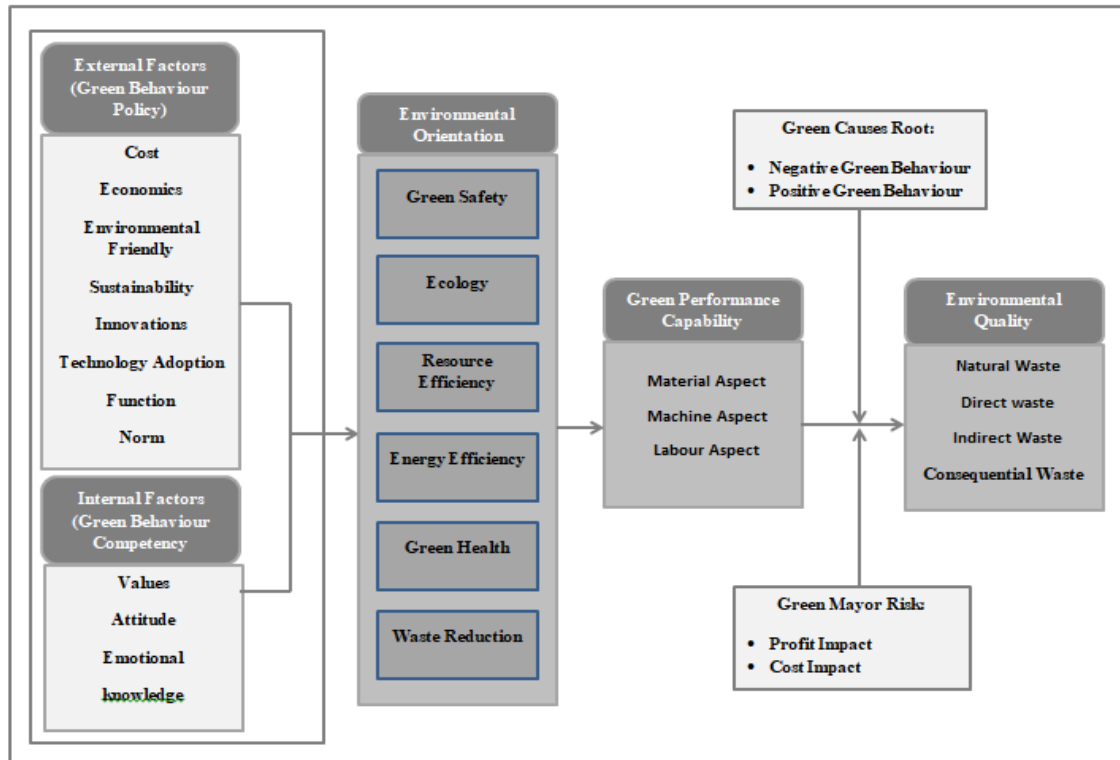


Figure 2. Behavioural green model of environmental quality.

5. Results

The conceptual model in this study builds on theories of green behaviour based on relevant previous research literature that has been described in the literature study. In this study will develop the theory of green behaviour which says that the green behaviour there are 3 dimensions in shaping the character that is 1) external factors (Green Habitability), 2) internal factors (Green Barrier) and 3) green performance (Green Behaviour). The theory is developed with green variables and indicators as a shaper of green behaviour in construction. This is because previous research on the development of the pro-environmental behaviour model does not explain that performance variables as something that should be integrated as micro implications or impacts that must be improved if they want to develop a green behaviour in the construction [58] [59]. However, various literatures prove that habitability and barrier behaviour cannot separately dimension from green performance. Next research will test in Indonesia construction [4] [5].

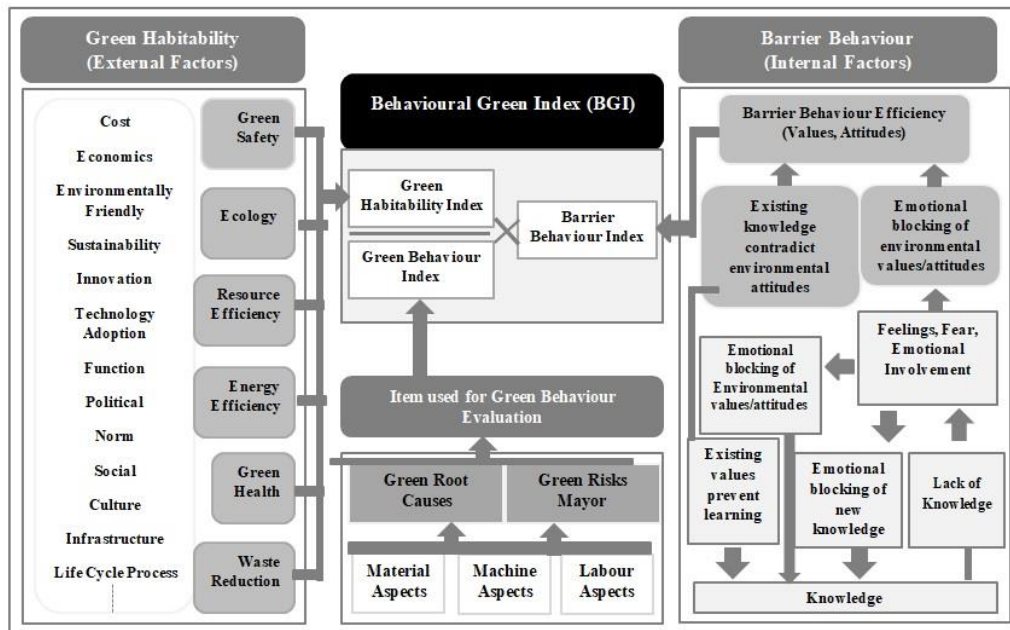


Figure 3. Conceptual framework of the Behavioural green index.

6. Discussion

Green behaviour are interconnected with the policy on macro level, performance on mezzo level and awareness on micro level.

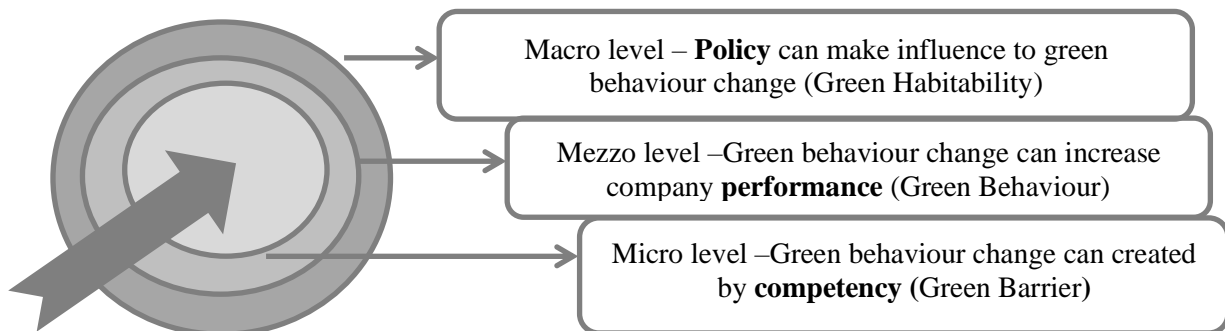


Figure 4. Green behaviour change model.

7. Conclusions

The results of this study indicate that in building a conceptual framework towards BGI, it is necessary policy, competency and performance as input at BGI [51]. In the policy there are four latent variables of environmental regulation policy, green behaviour or project policy, reward policy and punishment policy. For awareness there are five latent variables of barrier behaviour, mental shortcut, emotional, knowledge and values attitudes. Latent variables in performance include rational preferences, maximise outcomes, act independently to measure behaviour risk and root cases [39,52]. This conceptual framework will be developed for further research to find out the relationship between the integrated variables and know the method of development of Behavioural Green Index in the construction industry [43,46,48,49].

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