UNIVERSITY OF BAHRAIN

College of Business Administration

Department of Management and Marketing

Promoting Employees' Green Behavior amongst Laboratories' Staff: The Role of Green Transformational Leadership and Green Values

A Thesis Submitted in Partial Fulfilment of the Requirements for the Master Degree of Business Administration

Submitted by

Yossra Fareed El-Tony

ID Number: 20052779

Supervised by

Dr. Choo Ling Suan

Assistant Professor

University of Bahrain

Kingdom of Bahrain

July 2022

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University of Bahrain
Deanship of Graduate Studies
And scientific Research

جامعة البحرين
عمادة الدراسات العليا والبحث العلمي

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The Discussion Committee met on 07-Jul-22 In University of Bahrain. Upon discussing the student whose details are stated above in public, the discussion committee recommends the following:

The student is awarded a grade A in the thesis subject.

☐ Without making any changes to the thesis.

☒ After making the modifications attached with this decision.

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Abstract

The scientific research plays a pivotal role in the progress of nations. Notwithstanding, there are detrimental impacts of some practices of academic laboratories on the environment. The aim of this study is to explore the employee green behavior in academic laboratories in the Kingdom of Bahrain. Through this study, the researcher aims to explain the impact of green transformational leadership style on employee green behavior, as well as the mechanisms of how the green transformational leadership affects the green behavior of employees. This study adopted qualitative approach. Data in this study was collected via in-depth questions through virtual interviews. The purposive sampling technique was used in this study to identify the participants as the data was collected from nine individuals who work in academic laboratories in the Kingdom of Bahrain. The obtained data was analyzed using ATLAS.ti 9 software. Five themes of employee green behavior emerged: (I) conserving, (II) avoiding harm, (III) transforming, (IV) influencing others, and (V) taking initiative. It was also found that employees green behavior is stimulated when leaders showed (I) vision, (II) encouragement, (III) intellectual stimulation, (IV) high performance expectation, (V) individual support, and (VI) group goals which characterized green transformational leadership. Based on the findings, managerial implications were proposed.

Keywords: Employee green behavior, Green transformational leadership, Individual green values, Laboratories, Kingdom of Bahrain.

Publications

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A debt of gratitude is owed to the participants, the backbone of this study, for their agreement to participate in this study and sharing their thoughts for the study.

During the threat of the COVID-19 pandemic on human life all over the world, I invested the quarantine time reading more papers, learning new qualitative analysis software and applying it. I enjoyed working on every chapter and felt that it was an interesting journey, beyond a task to be accomplished in this academic endeavor. I am grateful for the grace of God who inspired me with

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Chapter 1 Introduction

1.0 Executive Summary

Scientific research generally contributes to the progression of humanity. The nature of work in academic laboratories is identified in four distinct types of practices; i) exercises to become accustomed to practical techniques, ii) experiences to feel the phenomena, iii) demonstration to grasp the theoretical foundation beyond the practical work, and iv) investigation to test the hypotheses (Tafa, 2012). All these practices are tackling the issues that humankind meets daily and transferring knowledge to next generations, especially students (Leite and Dourado, 2013).

Despite the contribution of research in human progress, scholars investigated the quantity of the waste generation and energy consumption that has resulted from laboratories' activities to estimate their impact on the environment. It was reported that "Energy use per square foot from science research labs is disproportionately higher than that of other rooms in buildings on campuses" (Kaplowitz, Thorp, Coleman, and Yeboah, 2012, p. 581). Laboratories use about five to ten times more energy per square meter than office buildings (Greever, Ramirez-Aguilar, and Connelly, 2020). At the Omar Dengo Campus of the Universidad Nacional in Heredia, Costa Rica, there is a program for treatment of wastewater that has consumed excessive water and power (Rodríguez-Rodríguez, Vargas-Villalobos, Aparicio-Mora, Nova-Bustos, and Pinnock-Branford, 2020).

The activities of laboratories have also increased with the recent threat of the COVID-19 pandemic, which eventually increased the clinical waste. Reports from several countries indicate that the generation percentage of clinical waste resulted from the pandemic has increased 1000%, 213%, 27%, and 17.1% in Jordan, China, Malaysia, and Indonesia (Agamuthu and Barasarathi, 2021). Similarly, in the context of the Kingdom of Bahrain, "The solid waste generated in the Kingdom of Bahrain has been calculated from various COVID-19 related activities. The waste estimated in a smaller country with around 2 million population is considerably high" (Al-Omran, Khan, Ali, and Bilal, 2021, p.7). Thus, this situation dictates an alarm to study the laboratories' activities that have a detrimental impact on the environment.

In consequence to these detrimental impacts of laboratories' activities on the environment, scholars noted that laboratory management and personnel behavior may significantly contribute in reduction of energy consumption and waste generation in laboratories (Kaplowitz et al., 2012). Hence, this study aims to explore the green behavior amongst laboratories' staff.

The first chapter of this study is organized into eight sections. Section 1.1 provides the background of the study, section 1.2 discusses the research problem, 1.3 and 1.4 list the research objectives and the research questions. Section 1.5 demonstrates the significance of the research, section 1.6 details the study setting, section 1.7 defines the key terms of the study, and section 1.8 illustrates the outline of the study.

1.1 Background of the Study

Although academic laboratories are the place to conduct research with the aim to affect significant change in human life, laboratories' activities can be considered a substantial producer of waste and greenhouse gas emission. Banks, Metz, and Smyth (2020) listed some challenges resulting from the activities of laboratories that have detrimental impact on the environment. First, is the plastic issue, as plastic is the major cause of climate change, blocked waterways and contains carcinogenic chemicals. Second, applying the biosafety of the five Rs, which are refuse, reduce, reuse, repurpose, and recycle. Third, dealing with pathogens that cause contamination and require a high-level of aseptic technique. Last but not least, is generation of waste products.

Scholars investigated the environmental challenges in various laboratories around the world. Mujtaba, Patel, and Karodia (2015) reported that the weekly amount of energy and water usage in the Chemical Engineering Laboratory of the University of Bradford in the United Kingdom, was 4900 litres of water usage and 135 kWh of energy usage per week. While Pourzamani et al. (2019) quantified the hazardous wastes (HW) produced from Isfahan University of Medical Sciences, Isfahan, Iran and reported that this university produced 2609.9 kg HW annually.

Recently, González, Velasco, and Candelo-Becerra (2020) analyzed the waste resulting from nine academic laboratories from Columbia institutions. The report revealed that most waste generated was from the biology laboratories followed by the chemistry laboratories. In addition, Yusoff, Abu Bakar, Rahmat Fakri, and Ahmad (2021) analyzed the greenhouse gas emissions

from living laboratories in University of Malaya, Kuala Lumpur, Malaysia. The report showed that 90.72% of emissions in 2016–2017 were due to electricity consumption.

As a result, the above mentioned waste produced quantities have motivated many scholars to examine environmentally-related behavior and to consider the determinants for this behavior.

In these academic endeavors, the term of environmentally significant behavior was founded by Stern (2000), pro-environmental behavior was established by Kollmuss and Agyeman (2002). Then, employees green behavior was coined by Ones and Dilchert (2012) and employees' pro-environmental behavior was introduced by Graves, Sarkis, and Zhu (2013). Eventually, the environmental workplace behavior was determined by Ciocirlan (2017).

Employees green behavior is a measured behavior, adopted by employees, has a positive or a negative impact on the environment (Ones and Dilchert, 2012). Ones and Dilchert (2012) built a model for this concept of employees green behavior which contains 16 homogeneous categories of environmental behavior at work, categorized into 5 basic meta-categories, titled the Green Five. Norton, Parker, Zacher, and Ashkanasy (2015b) divided this concept into required and voluntary green behavior called "in-role" and "extra-role" respectively. Thus, employees green behavior is related to employees at workplace. Specifically, it contains the two extreme edges: beneficial and harmful effects towards the environment. The concept of employees green behavior is adopted in this study due to its popularity amongst dominant scholars in various fields such as the industry sector (e.g. Chaudhary, 2019,

2020; Dumont, Shen, and Deng, 2017; Klein, 2015; Kongrerk, 2017), the educational sector (e.g. Fawehinmi, Yusliza, Mohamad, Faezah, and Muhammad, 2020; Ralston, 2016), and the medical sector (e.g. Ghabash, Kareem, and Al_Birki, 2018; Mohideen, Selvakumar, Harasudha, and Maran, 2019).

On the other hand, scholars attempted to build theories to learn how a behavior of employees green behavior could be promoted in organizations. Burns (1978) proposed the Transformational Leadership Theory, which focuses on leaders who could motivate followers to perform beyond what is expected of them and also beyond their own self-interests. Bass (1985) formulated four characteristics of this style of leadership, which were: (I) charisma, (II) inspirational leadership, (III) individualized consideration, and (IV) intellectual stimulation. Then, Podsakoff, MacKenzie, and Bommer (1996) expanded these characteristics proposed by Bass (1985) into six characteristics. Rooted from the work of Podsakoff et al. (1996), Chen and Chang (2013) advanced the leadership concept and coined a new concept titled a green transformational leadership. According to Chen and Chang (2013), green transformational leadership is defined as a motivation of followers by the leader to accomplish the environmental goals of organization and what exceeds that goal.

A plethora of studies in the literature investigated the role of green transformational leadership on achieving the environmental goals of organizations. For example, Chen and Chang (2013) and Zhou, Zhang, Lyu, and Zhang (2018) studied the impact green transformational leadership on green product development performance. Later, Chen, Chang, and Lin (2014)

extended their previous work to study the impact of green transformational leadership on green performance while influence of green transformational leadership on green creativity was studied by W. Li et al., (2020) and Mittal and Dhar (2016). Accordingly, green transformational leadership is adopted in this study to assess its association with employee green behavior.

Stern, Dietz, Abel, Guagnano, and Kalof (1999) developed the Value-Belief-Norm theory to explain how any social movement such as the environmentalism could be activated based on the individual values such as (i) values, (ii) beliefs, and (iii) norms. Based on this theory, Zhou et al. (2018) posited the term individual green values that combines only two components of Value-Belief-Norm theory, which are beliefs and norms. Individual green values are defined as the attitude and behavior of an individual as a consequence of the sustainable development (Zhou et al., 2018). Nevertheless, only few pieces of research studied this type of values as a mechanism to achieve green variables. For example, individual green values strengthen the ability of green transformational leadership to instill a green climate to produce a green product (Zhou et al., 2018). Accordingly, individual green values are adopted in this study as a mechanism between the green transformational leadership and employee green behavior.

In sum, this study aims to explore the green behavior amongst staff in academic laboratories, in addition to determining what the outcomes of green transformational leaders on individual green values and employee green behavior.

1.2 Research Problem

Numerous studies investigated the status of environmental behavior amongst staff in academic laboratories. For example, globally, Mujtaba et al. (2015), Ho and Chen (2018), Pourzamani et al. (2019), Goh, Wong, and Ong (2020), González et al. (2020), Yusoff et al. (2021) studied the applied green behavior in academic laboratories in the United Kingdom, Taiwan, Iran, Singapore, Colombia, and Malaysia respectively. Over the Gulf Cooperation Council, Hanifa and Elzagheid (2019) described the approaches of the chemical waste disposal in one of the colleges in the Kingdom of Saudi Arabia.

To the knowledge of the researcher, only limited studies examined the environmental behavior amongst staff in academic laboratories in the Kingdom of Bahrain (except: Mohamed, Ebrahim, and Al-Thukair (2009) and Al-Omran et al. (2021)). However, both of them focused on biomedical waste from the healthcare facilities. Moreover, both studies confined to the perspective of physicians, nurses, and radiologists.

It is recognized that the staff of academic laboratories might have a different perspective regarding the green behavior at their workplace since the nature of their jobs focuses on teaching and creating innovations in a wide range of science disciplines and involves students and researchers. In contrast, laboratories in health care facilities focus on diagnosing diseases and deal with patient samples. Therefore, this study aims to explore the green behavior amongst staff in academic laboratories at the Kingdom of Bahrain which is seen as to enrich our current understanding about employee green behavior.

The majority of study relates to laboratories focussing on a quantitative approach to quantify the consumption of energy, water, and chemicals, emissions of greenhouse gas and production of waste (see, for example, Mujtaba et al., 2015; Goh et al., 2020; González et al., 2020; and Yusoff et al., 2021). Limited studies considered qualitative approach (Pourzamani et al. 2019; Wright, Ironside, and Gwynn-Jones, 2008). Hence, a qualitative approach to explore in-depth the current status of employee green behavior in academic laboratories is warranted.

To understand the factors that lead to green behavior, many researchers have investigated the role of green transformational leadership. For example, the role of green transformational leadership was examined with green product development performance by Chen and Chang (2013) and Zhou et al. (2018) and with green performance by Chen et al. (2014). While the role of green transformational leadership in stimulating the employees green creativity was studied by W. Li et al. (2020) and Mittal and Dhar (2016). Studies that have investigated the role of green transformational leadership on green variables such as employee green behavior in the workplace remain few and warrant further investigation.

Value-Belief-Norm theory has been confirmed by some studies on its importance to promote environmentalism (e.g., Schultz, 2001; Steg, Dreijerink, and Abrahamse 2005; Stern, 2000; Stern et al., 1999). To the knowledge of the researcher, not many studies have considered value as an explanatory mechanism. Zhou et al. (2018) recommended investigating the role of individual green values as a mediator. Echoing the call from Zhou et

al (2018), this study aims to study the role of individual green values between green transformational leadership and employee green behavior.

Based on the above-discussed literature gaps, this study aims to explore the green behavior in academic laboratories in the Kingdom of Bahrain from the perspective of laboratories' staff. In addition, this study also aims to determine how green transformational leadership impacts the green behavior of laboratories' staff and to understand the mechanism between green transformational leadership and green behavior at laboratories.

1.3 Research Objectives

Based on the above research problems, the objectives for this study are outlined as below:

1. To explore in-depth the extent of employees green behavior amongst staff in academic laboratories
2. To describe the impact of green transformational leadership on the employees green behavior
3. To comprehend the intervening mechanism between green transformational leadership style and employees green behavior.

1.4 Research Questions

To achieve the above objectives, three questions are proposed as below:

Research Question 1: What is the meaning of green behavior for staff at academic laboratories?

Research Question 2: How does the green transformational leader/supervisor affect the green behavior amongst staff at academic laboratories?

Research Question 3: How do the individual green values interfere between green transformational leadership style and employee green behavior for staff at academic laboratories?

1.5 Research Significance

As far as the researcher is aware, there is a scarcity in the conducted studies on the performed green behavior in the academic laboratories' sector in the Kingdom of Bahrain. Hence, it is constructive to explore the experience of employees in academic laboratories in the Kingdom of Bahrain regarding their behavior towards the environment. Thus, this study will enrich this gap in the literature for researchers in the Kingdom of Bahrain regarding the environmental status of academic laboratories, especially after the COVID-19 pandemic.

Green transformational leadership is a form of leadership derived from the Transformational Leadership Theory. Although there is a substantial amount of study examining this form of leadership as a determinant of several variables related to the environment, not many studies have examined the association of green transformational leadership on employee green behavior at an academic laboratory setting. Thus, it is worthwhile to understand the association of green transformational leadership on employee green behavior.

Stern et al. (1999) established Value-Belief-Norm theory as a determinant of environmentalism and there is no consensus on which its components have a

significant impact on environmentalism (e.g., Bidwell, 2013; Steg et al., 2005; Stern et al. 1999). Based on Stern et al. (1999), the concept of individual green values was introduced by Zhou et al. (2018) to promote the green behavior of employees at their workplace. The literature related to this form of value as an explanatory mechanism between green transformational leadership and green variables still is in its infancy. Thus, this study will contribute to fill this gap by interpreting the interfering mechanism of individual green value between green transformational leadership and employee green behavior.

1.6 Research Setting

In this study, a qualitative method based on an exploratory nature and a constructivist paradigm were adopted to explore the employee green behavior in academic laboratories. Thus, a purposive sampling technique was employed to identify the participants who work in academic laboratories in the Kingdom of Bahrain. Virtual interviews with in-depth questions were conducted to solicit information from participants. The thematic analysis for the collected data was carried out by qualitative analysis software, ATLAS.ti 9 in an inductive reasoning manner.

1.7 Research Terminology

The major key terms that are used in this study are defined as the following. More minor terms will appear in various Chapters along the study as required.

1. **Employees Green Behavior (EGB)** is defined as "Scalable actions and behaviors that employees engage in that are linked with and contribute to or detract from environmental sustainability" (Ones and Dilchert, 2012, p. 87).

2. **Green Transformational Leadership (G-TFL)** is defined as "Behaviours of leaders who motivate followers to achieve environmental goals and inspire followers to perform beyond expected levels of environmental performance" (Chen and Chang, 2013, p. 109).
3. **Individual Green Values (IGV)** are defined as "Green values are the result of sustainable development, which mainly refers to individual attitudes and behaviours in sustainable development" (Zhou et al., 2018, p. 5).

1.8 Outline of the Thesis

The forthcoming four chapters in this study are arranged as follows:
Chapter two reviews the literature related to employee green behavior. This chapter outlines the determining factors in employee green behavior. The last section of this chapter explains the theoretical foundation that underpins this study and then, proposes the conceptual framework of this study.

Chapter three explains the methodological approach adopted in this study as well as the procedures of data analysis.

Chapter four presents the findings obtained from the data collection such as the demographic information of participants, emerged sub-codes, codes and themes from the data analysis. A comprehensive demonstration of the whole framework is elucidated at the end of this chapter.

Chapter five exhibits an interpretation of the obtained findings to answer the research questions. The themes of employee green behavior amongst

laboratories' staff, the impact of green transformational leadership on employee green behavior, and the mechanisms of individual green values on employee green behavior are analyzed thoroughly. The chapter also outlines the limitations and offers recommendations for future research to address these limitations. An implication with a summary of this study is presented at the last section of this study.

Chapter 2 Literature Review

2.0 Introduction

This chapter aims to review the literature related to green behavior. First, all concepts related to environmental behavior in the workplace are discussed. Next, a review was conducted to understand the antecedents of employee green behavior. Then, themes based on these antecedents are proposed. After that, the theoretical foundation that underpins this study is explained. Finally, propositions for this study are proposed.

2.1 Conceptualization of Employee Green Behavior, EGB

Based on a review of the available literature, there is a wide variety of related terminologies to illustrate human behavior related to the environment. Accordingly, the researcher developed Fig. 2.1 to show the development of these terminologies.

Environmentally significant behavior (ESB) was founded by Stern (2000) and categorized into two dimensions: impact-oriented and intent-oriented. Impact dimension means to which extent the behavior could change the natural sources availability and modify the ecosystems framework (Stern, 2000). Stern (2000) classified this dimension to two types: direct behavior and indirect behavior. The direct behavior is action that directly impacts environment, such as deforestation and pollution, while the indirect behavior proposes practices that indirectly affect environment such as discourses on environmental issues and adopting new environmental policies (Stern, 2000).

In keeping with Stern (2000), Fu, Zhang, Xiong, and Bai (2018) and Steg and Vlek (2009) all of whom advocate the impact-oriented dimension. Private behavior refers to a "direct type" of behavior whereas public behavior is referred to as the "indirect type" (Fu et al., 2018). To sum up, the impact dimension has been established as a normal result of luxurious behavior of humans towards nature.

While the intent dimension focuses on the actions that are intentionally taken to influence the environment positively (Stern, 2000), the differentiation between these two dimensions is important in order to choose the appropriate one according to circumstances. Specifically, impact definition focuses on behavior that makes change to the environment, while intent is defined as a consideration of an individual's personal values with relation to changing their behavior towards the environment.

Kollmuss and Agyeman (2002) broaden the intent-oriented dimension, introduced pro-environmental behavior (PEB) which refers to actions that intentionally look to diminish the harmful impact of human behavior on the environment, such as minimizing the use of electricity and using recyclable materials. This definition is supported by Blok, Wesselink, Studynka, Kemp (2015) and Vinojini and Arulrajah (2017), as it emphasizes the consciousness of an ordinary person when performing such concepts.

Under the research theme related to environmental issues at organizational level, several scholars developed new concepts with new definitions. To illustrate, Ones and Dilchert (2012) suggested a new concept called employee green behavior (EGB). This EGB is defined as "Scalable actions and

behaviors that employees engage in that are linked with and contribute to or detract from environmental sustainability" (Ones and Dilchert, 2012, p. 87). This definition of EGB receive support from many scholars in the field such as Mesmer-Magnus, Viswesvaran, and Wiernik (2012), Norton et al. (2015b), Norton, Zacher, Parker, and Ashkanasy (2017), Ones, Wiernik, Dilchert, and Klein (2015), and Safari, Salehzadeh, Panahi, and Abolghasemian (2018) who advocate that EGB is a comprehensive term of measurable environmental actions in the workplace.

Ones and Dilchert (2012) built a model of EGB based on empirical data that was collected via critical incidents through three stages, namely, 1) development phase; from twenty United Status industries, 2) confirmation phase; from sixteen United Status industries, 3) generalization phase; from Europe. This work led to 16 homogeneous categories of environmental behavior at work. They further classified these 16 categories into 5 basic meta-categories, which are titled the Green Five, as illustrated in Fig. 2.2.

These five meta-categories of EGB are listed as the following: *(i) Conserving;* which refers to saving resources and minimizing waste. This includes reusing, recycling, reducing and repurposing of natural resources, (ii) *Avoiding harm;* is attributed to diminishing the negative impacts of human behavior on environment, including decreased pollution, deforestation and emissions. This category requires cautiousness and responsibility, (iii) *Working Sustainability;* it means accepting and adopting all new and innovative approaches which are more suitable for environment such as adopting renewable energy and purchasing green products, (iv) *Influencing others;* this meta-category comprises supporting and encouraging others to

behave in an environmentally friendly manner. This could be done via education, training and providing incentives, (v) *Taking initiative;* this category points to taking proactive decisions or actions to change the current status such as launching new environmental programs and putting environmental issues first in all new policies (Ones and Dilchert, 2012). In 2015, the *working sustainability* meta-category was termed as *Transforming* by Ones et al. (2015) as to work sustainable, which requires changing the status quo. Openness to change is the core feature of this meta-category. In 2018, an additional category was added to (iv) *Influencing others* called "managing, facilitating and coordinating" by Ones, Wiernik, Dilchert, and Klein (2018). Thus, the total number of categories of Green Five is 17.

Norton et al. (2015b) divided the EGB into required EGB and voluntary EGB. According to Safari et al. (2018) and Weerarathna, Jayarathna, and Pintoe (2017), the former is required due to an employee's position, such as producing sustainable products. In other words, required EGB is a behavior required by an employer as the behavior affects the organization. While the latter type is environmental behavior that shows an employee's discretion which is beyond the organization's requirements. This means that voluntary EGB is a personal initiative such as initiating environmental awareness campaigns. In-role EGB is a called for the required type and extra-role EGB is called for the voluntary type (Yuriev, Boiral, Francoeur, and Paillé, 2018).

In support of the EGB concept coined by Ones and Dilchert (2012), Mesmer-Magnus et al. (2012) improved the work of Kollmuss and Agyeman (2002) and defined PEB as "Individual behaviors contributing to environmental sustainability (such as limiting energy consumption, avoiding waste,

recycling, environmental activism)" (Mesmer-Magnus et al., 2012, p. 89). In this light, Ones et al. (2015) hold the same view of Mesmer-Magnus et al. (2012), since the concept of PEB provided by Kollmuss and Agyeman (2002) was related to general individual behavior. Additionally, the concept of revised PEB is more comprehensive as it considers environmental sustainability activities such as recycling, reusing and reducing that could be adapted in either a public or private space based on individual belief and without intervention from organizations.

Adopting the concept of PEB coined by Mesmer-Magnus et al. (2012) at workplace, Graves et al. (2013) introduced employees' PEB which refers to "A broad set of environmentally responsible activities such as learning more about the environment, developing and applying ideas for reducing the company's environmental impact, developing green processes and products, recycling and reusing, and questioning practices that hurt the environment" (Graves et al., 2013, p. 81). The concept of an employees' PEB was later adopted by Kura (2016) as green behavior at work (GBW). According to Kura (2016), GBW refers to wise and responsible usage of natural resources in the work place. The concept of GBW can be initiated by either the organization or the employee.

Ciocirlan (2017) proposed another terminology to narrow the spectrum more at work level in organization, termed environmental workplace behavior (EWB). EWB points out to all work behavior that maintain the environment, but they may or may not add a credit for organization. According to Lasrado and Zakaria (2020), EWB can be a novel category that stands on its own instead of being under organizational citizenship behavior as EWB includes

environmental in-role behavior, environmental organizational citizenship behavior, as well as environmental counter-productive work behavior.

As illustrated above, the advantages of EGB over PEB are attributed to the following features; 1) an organizational monitoring of environmental behavior, 2) an environmental performance as organizational target, and 3) the scope (positive or negative) (activation or inhibition) (Mesmer-Magnus et al., 2012; Ones et al., 2015). Therefore, this study considers the term EGB as it matches with the aim of this study. This also concurs with works from previous scholars such as Ciocirlan, Gregory-Smith, Manika, and Wells (2020), Dumont et al. (2017), Fawehinmi et al. (2020), Kim, Kim and Han (2019), Klein (2015), McNulty (2015), Tian, Zhang, and Li (2020), Tsai, Lu, and Chang (2017), Yang (2019) and Zhang, Luo, Zhang, and Zhao (2019).

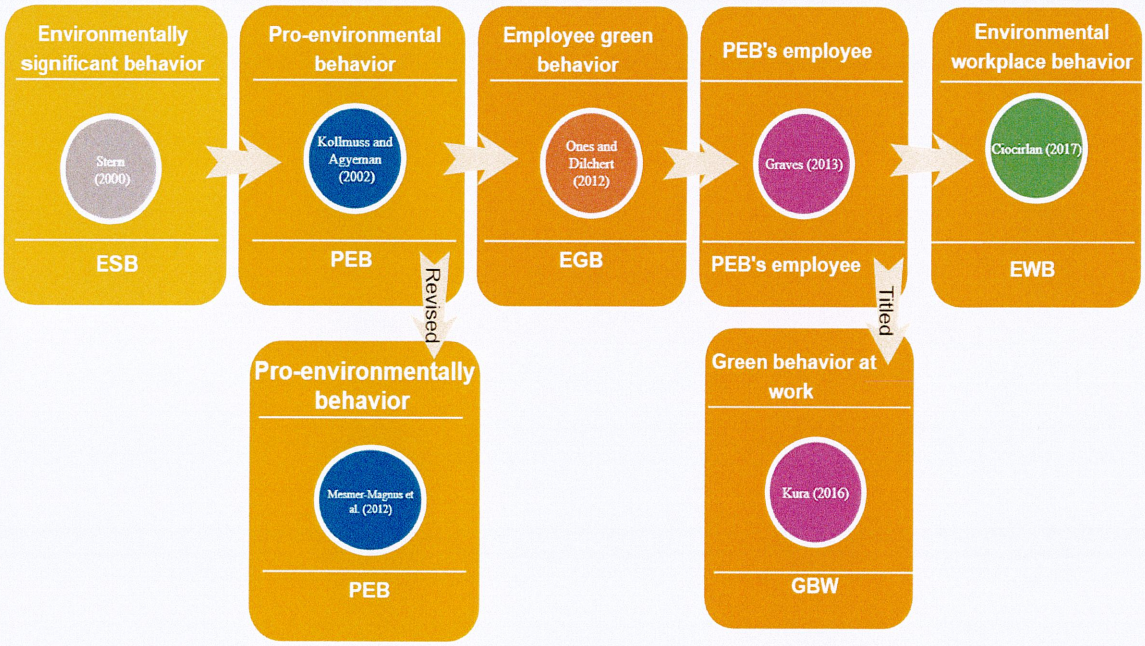


Fig. 2.1: The development of terminologies related to environmental behavior

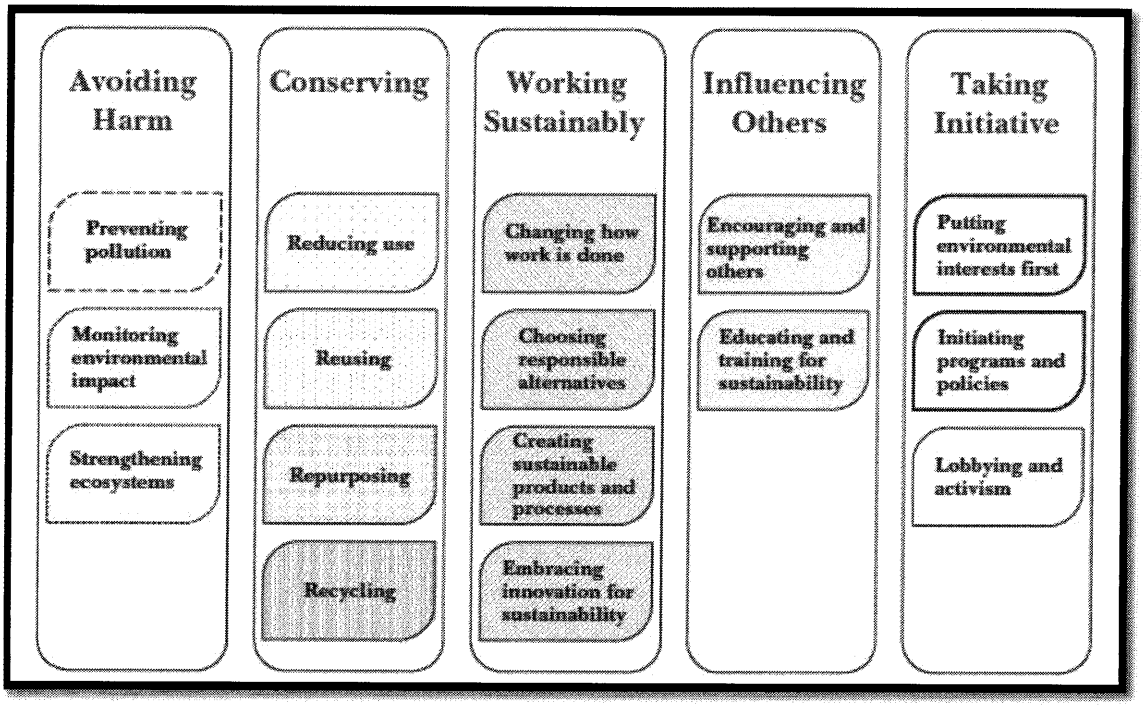


Fig. 2.2: The Green Five taxonomy (Source: (Ones and Dilchert (2012))

2.2 Determinants of EGB

There are three comprehensive reviews summarizing all published works regarding antecedents of EGB which were conducted by Mesmer-Magnus et al. (2012), Ones et al. (2015) and Norton et al. (2015b). The work of Mesmer-Magnus et al. (2012) was done to investigate the approaches of individual environmental commitment towards EGB. Mesmer-Magnus et al. (2012) reported the antecedents of EGB, which are environmental knowledge, environmental awareness, environmental attitudes, environmental commitment, personality, motives, values, demographic variables (i.e., age, gender, education level, income level), and organizational variables (i.e., job requirements, organizational support, and employee commitment).

The second review was performed by Ones et al. (2015). According to Ones et al. (2015), antecedents reported by Mesmer-Magnus et al. (2012) were constructive to offer an insight for intervention. Based on the reported antecedents by Mesmer-Magnus et al. (2012), Ones et al. (2015) categorized the antecedents into organizational intervention and individual intervention to stimulate EGB.

Underpinning the four main theories: Theory of Planned Behavior (Ajzen, 1991), Theory of Normative Conduct (Cialdini, Reno, and Kallgren, 1990), Social Exchange Theory (Cropanzano and Mitchell, 2005), and the Self-Determination Theory (Ryan and Deci, 2000), a third review assessing the antecedents of EGB was performed by Norton et al. (2015b) and classified the determinants of EGB into contextual factors (institutional, organizational, leader and team), and personal factors (within-person and between-person).

Based on the work of Norton et al. (2015b), the following two subsections present the determinants of EGB, namely personal factors and organizational factors.

2.2.1 Personal Factors

Various personal factors have been studied in the past in relationship to the EGB such as (I) demographic factors (age, marital status, gender, education level, and tenure), (II) personal traits, and (III) psychological factors (attitudes, intention, motivation, and satisfaction).

Amongst the demographic factors that were studied was age (Norton, Parker, and Ashkanasy, 2015a; Wiernik, Dilchert, and Ones, 2016), marital status

(George and Jayakumar, 2019; Mohideen et al., 2019; Norton et al., 2015a; Weerarathna et al., 2017), gender (George and Jayakumar, 2019; Kim et al., 2019; Weerarathna et al., 2017), education level (George and Jayakumar, 2019; Weerarathna et al., 2017), and tenure (Norton et al., 2015a; Weerarathna et al., 2017).

The effect of the aging on EGB was reviewed thoroughly in the work of Norton et al. (2015a). The empirical survey was conducted in 11 countries with the responses collected from 4676 professional workers by Wiernik et al. (2016). The empirical results were aligned with the theoretical arguments presented by Norton et al. (2015a). That is, the linearity relations of age with EGB meta-categories (conserving, avoiding harm, and taking initiatives), were explained by the arguments of frugality, conscientiousness and prioritization respectively, while the non-linearity relations of age with the remaining meta-categories (transforming and influencing others) could be explained by the arguments of convenience and motivation respectively.

The relationship between marital status and EGB was investigated by several scholars such as George and Jayakumar (2019), Mohideen et al. (2019), Norton et al. (2015a) and Weerarathna et al. (2017). However, their findings were inconclusive. In particular, the finding of Weerarathna et al. (2017) revealed that there was a positive association between being married and performing green behavior. This finding was derived from the survey of 170 respondents in manufacturing sectors in Sri Lanka. On the other hand, the findings reported by Norton et al. (2015a) and the findings of George and Jayakumar (2019) were similar. They stated that marriage status negatively correlated with environmental behavior. This negative relation was attributed

to the reason that respondents tend to prioritize family issues over environmental issues during married life (Norton et al., 2015a). However, such negative relationship was not valid amongst highly educated respondents as demonstrated in the study of George and Jayakumar (2019). Using the sample of 52 faculty members from one university in India, George and Jayakumar (2019) revealed that the respondents were educated persons who were aware of the harmful behavior to environment regardless of their marital statuses.

To clarify this contradiction in the role of marital status on EGB, Mohideen et al. (2019) investigated the effect of marital status on every meta-category of EGB. Data was collected via online questionnaire from 150 respondents who worked in a medical research center in India. The result stated that there was a significant impact of marital status on only two specific meta-categories of EGB (avoiding harm and conserving resources). This finding supports the finding of Weerarathna et al. (2017). Meanwhile, marital status did not show a significant effect on the other two meta-categories of EGB (sustainability and taking initiative) which supports the findings of George and Jayakumar (2019) and Norton et al. (2015a).

In addition to age and marital status, the relationship between gender and EGB was investigated by George and Jayakumar (2019), Kim et al. (2019) and Weerarathna et al. (2017). The finding of George and Jayakumar (2019) pointed out that there was no significant differences in EGB amongst the male and female faculty members. This result was in a contrast to Kim et al. (2019) and Weerarathna et al. (2017) where both revealed that there was a positive association between gender and green behavior.

Education is commonly known as the development of knowledge. Education was found to play a vital role on green behavior as concluded by both George and Jayakumar (2019) and Weerarathna et al. (2017). It is found that the educational level of respondents had a positive bearing on EGB. To clarify, the finding of Weerarathna et al. (2017) revealed that there was a positive association between being highly educated and performing green behavior. In addition, George and Jayakumar (2019) revealed that there was no significant differences in EGB amongst the faculty members based on their academic disciplines.

In terms of organization tenure, the findings of Weerarathna et al. (2017) confirmed the argument of Norton et al. (2015a), which stated that employees who worked for a long period of time showed the least level of EGB. Weerarathna et al. (2017) revealed that the more experience the employee had, the less capability to perform green behavior. This result concurred with the argument put forward by Norton et al. (2015a), who argued that elder employees prefer convenience and habit over adopting new approaches.

In addition to the previous-mentioned demographic factors, personal traits were investigated by several scholars (Morton, Hill, and Meiring, 2018; Norton et al., 2015a).

The effect of the big five personality traits on green behavior was studied by Morton et al. (2018). Norton et al. (2015a), proposed that conscientiousness trait predicted EGB. Later on, Morton et al. (2018) found that conscientiousness significantly predicted EGB practically as well as additional two personality traits namely negative social-relational disposition

and neuroticism. Morton et al. (2018) sampled 313 South African employees from various industries via online questionnaire. The findings suggest that that personality traits could be employed in human resources management such as recruiting and training to support the environmental goals of organization. Finally, the authors suggest testing the effect of personality traits on different ethnicities and a larger sample to accurately validate and generalize this result.

In addition to the demographic and personality traits, psychological factors such as attitude (Manika, Wells, Gregory-Smith, and Gentry, 2015; Tian et al. 2020), intention (Norton et al., 2017), internal motives (Cuifang and Rui, 2019; Klein, 2015; Tian et al., 2020), and job satisfaction (Kim et al., 2019; Ralston, 2016) were examined in the relation with EGB.

Manika et al. (2015), Norton et al. (2017) and Tian et al. (2020) investigated the impact of an individual's attitude and intention on EGB. These studies supported the tenet proposed in Theory of Planned Behavior in the environmental context. That is, an individual's attitude affects the individual's intention, which in turn, affects the individual's behavior (Ajzen, 1991). For instance, Manika et al. (2015) and Tian et al. (2020) confirmed that individual attitude had a positive and significant impact on EGB. Moreover, Norton et al. (2017) revealed that an individual's intention was positively related to next-day EGB. Thus, the individual's attitude and intention components of Theory of Planned Behavior are potential psychological factors of EGB.

Another psychological factor, such as internal motivation has been studied by Cuifang and Rui (2019), Klein (2015), and Tian et al. (2020) and their findings were identical. According to Self-Determination Theory, internal motives can

be intrinsic to personal pleasures or identified to personal values to promote a behavior (Ryan and Deci, 2000). To elucidate, in a qualitative study that used critical incidents interview amongst 274 employees from the United States and Europe, Klein (2015) found that internal green motivation was a predictor of EGB. Similarly, using a quantitative survey amongst 305 Chinese employees who worked in various organizations, Cuifang and Rui (2019) found a similar result. Likewise, Tian et al. (2020), conducted an empirical study in China also demonstrated that EGB was positively affected by green motivation.

In a workplace setting, Ralston (2016) proposed an employee's job satisfaction as an influential factor on EGB. An interview of eight cleaning staff was conducted from schools in two different districts in Canada. Ralston (2016) demonstrated that the sense of pride due to job satisfaction was one of opportunities for cleaners at school to perform green behavior. While using 151 office workers in a financial organization in South Korea, Kim et al. (2019) found that the work group with a higher job satisfaction was more likely to engage in green behavior. Findings from these studies show that employees who feel good about their job are likely to have a higher internal motivation which in turn leads to the exhibition of improved green behavior (Kim et al., 2019; Ralston, 2016).

2.2.2 Organizational Factors

Scrutinizing the exisiting literature related to EGB revealed that there are three main organizational factors that have been examined to affect EGB, namely (I) organizational practices (II) organizational leadership, and (III) organizational climate.

Organizational practice refers to formal actions that are taken by the organization to achieve the pre-established organizational objectives (Kostova and Roth, 2002). Several organizational practices were examined to estimate their effects on EGB, such as (I) green human resources management (Chaudhary, 2019, 2020; Dumont et al., 2017; Fawehinmi et al., 2020; Zhang et al., 2019) (II) public relations (Klein, 2015) as corporate social responsibility (Kongrerk, 2017), (III) policy (Lasrado and Zakaria, 2020; Norton, Zacher, and Ashkanasy, 2014), (IV) communication (Lasrado and Zakaria, 2020; Ralston, 2016), and (V) support (Lasrado and Zakaria, 2020; Manika et al., 2015).

Armstrong (2000), defines Human Resources Management (HRM) as an approach to effectively manage human resources to achieve organization goals. Daily and Huang (2001) integrated the organization's environemtal interests into their human resources management. The result of this integration coined the concept called Green Human Resources Management (GHRM). GHRM comprises of five green HRM practices: namely (1) green recruitment and selection (GRS): hiring candidates who are inclined to save the environment, (2) green training and development (GTD): utilizing education to make employees aware of issues related to environment, (3) green performance management "appraisal" (GPM): enhancing an employee's skills based on the environmental policies of the organization, (4) green pay and reward "compensation" (GPR): rewarding employees based on their enviroenmtal perfomance, and (5) green involvement "engagement" (GI): giving authority to an employee to make decisions for the benefit of the environment (Daily and Huang, 2001).

The findings on the link between GHRM and EGB were not conclusive. Some studies found GHRM was a significant predictor of both in-role and extra-role of EGB (e.g., Chaudhary, 2019, 2020; Zhang et al., 2019), while other studies found that GHRM effected only in-role EGB (e.g., Dumont et al., 2017). Intrestingly, some studies found that there was no effect at all between GHRM and EGB (e.g., Fawehinmi et al., 2020). In Chaudhary (2019) who collected data from 91 employees worked in different hierarchical levels in the Indian automobile sector and then, in Chaudhary (2020) who expanded the same sample to 301 employees, each found a positive and significant relationship between GHRM and EGB. Zhang et al. (2019), who collected data from 145 employees in Chineese Industry sector, advocated the positive relation between GHRM and both EGB. Conversely, Dumont et al. (2017) surveyed 388 Chinese employees working in an Australian multinational company specialized in food packaging products, revealed that GHRM affected only in-role EGB. Using data obtained via self-administered survey from 425 lecturers in Malaysian public research universities, Fawehinmi et al. (2020) revealed that GHRM had no significant effect on EGB.

In addition, analyzing existing studies relating to the GHRM and EGB showed that not all practices of GHRM influence EGB. Daily and Huang (2001) defined GTD as equipping employees with the appropriate work approaches relating to the environment as environmental management standards and pro-environmental behavior. Chaudhary (2019) stated that GTD scored the highest amongst all GHRM practices in influencing EGB. Drain et al. (2007) explained that training provides an opportunity for employees to practice a new behavior. Empirically, the result of Cuifang and Rui (2019) concurred

with Chaudhary (2019) which demonstrated that training enhances an exhibition of EGB.

Nevertheless, in examining the effect of the practice "compensation" (GPR) of GHRM, literature showed that there is no consensus on the role of financial incentives on EGB. Daily and Huang (2001) defined GPR as a system for rewarding employees for behavior that achieves organizational sustainability during the course of their work, as well as, GPR reflects the commitment of organization towards the environment. For instance, both study from Chaudhary (2019) and Zhang et al. (2019) stated that GPR not significantly affected the EGB (in-role). Both studies from Chaudhary (2019) and Zhang et al. (2019) were sampled using respondents from industry background. Conversely, Klein (2015) proposed the financial/cost considerations as one of the organizational motives to promote EGB. Similarly, Manika et al. (2015) confirmed that the organizational incentives had a positive and significant relationship to EGB. Concurring with Klein (2015) and Manika et al. (2015) in their qualitative study, Lasrado and Zakaria (2020) described that an incentives strategy was one of the management strategies likely to promote green behavior.

Public relations is another form of organizational practices and was defined by John and Lamme (2011) as maintaining a favorable image of the company in the eyes of the average citizen through various activities conducting by a company. Accordingly, Klein (2015) proposed public relations as one of the fundamental factors that should be considered by most organizations in promoting EGB. Subsequently, Kongrerk (2017) investigated the role of one form of public relations which was corporate social responsibility. Kongrerk

(2017) collected data from 638 respondents in Thailand and confirmed that corporate social responsibility had a positive and significant effect on EGB which concurs with the findings of Klein (2015).

Organizational policy is a form of organizational practices that forms the principle guidelines in a specific topic to shape employee's performance and to aid decision making (Six and Sorge, 2008). Thus, organizational policy could shape employee's performance with regards to the environment such as EGB. Norton et al. (2014) highlighted that in encouraging EGB, a green work climate perception on the presence of organizational sustainability policy is important. In their study which collected data from 168 employees, Norton et al. (2014) confirmed that there was a positive relationship between an organizational sustainability policy and EGB, and a green work climate perception fully mediated this relationship. Likewise, the findings of Lasrado and Zakaria (2020) concurred that corporate policies and regulations were deemed a major stimulus of EGB.

According to Kheirandish, Avilagh, and Nazemi (2017), an organization that had an environmental policy but did not communicate the policy to employees effectively, will still face failure in achieving its environmental goals. Organizational communication refers to the exchange of information, meaning and activities between a sender (organization) and a receiver (employee) with a proper inference (Kheirandish et al., 2017). Unzicker, Clow, and Babakus (2000) revealed that there is a positive relationship between effective organizational communication and perception by employees. Therefore, some scholars are of the opinion that the value of organization policies and employee perception relies on the effectiveness of

communication. Specifically, the study of Ralston (2016) concluded that consistent communication of the organization policy to all an organization's hierarchy was crucial for EGB. The study of Ralston (2016) suggested that sustainable aims and policies need to be communicated to subordinates by all means available, such as a checklist, leaflet and promotion. Additionally, the findings of Lasrado and Zakaria (2020) supported that it was important for an organization to adapt an appropriate communication style to suit an individual employee's circumstances when communicating information regarding required green behavior.

According to Eisenberger, Stinglhamber, Vandenberghe, Sucharski, and Rhoades (2002), organizational support refers to the employee's perception of which extent their organization values their contributions and concern about their welfare. When employees perceive that an organization values their concerns about their welfare, they are likely to reciprocate by exhibiting behavior that is appreciated by the organization such as performing EGB (Eisenberger et al., 2002). Using this line of rationale, several studies have examined the predictor role of organizational support on EGB. In the study of Manika et al. (2015) revealed that organizational support had a positive and significant relationship to EGB. Likewise, Lasrado and Zakaria (2020) stated that the support system was a stimulus for green behavior.

In addition to organizational practices, past studies also reported that organizational leadership (Ghabash et al., 2018; Lasrado and Zakaria, 2020; Yang, 2019) and organizational climate (Dumont et al., 2017; Norton et al., 2014; Norton et al., 2017; Tsai et al. 2017) are important factors in accelerating EGB.

Leaders are responsible in shaping the organization's direction and formulating the organization's strategy to achieve the necessary organizational goals (Leroy, Segers, van Dierendonck, and den Hartog, 2018). Collecting data from 119 employees in commercial banks in Iraq, Ghabash et al. (2018), demonstrated that modest leadership positively affected EGB. In the Chinese context, Yang (2019), who collected data from 317 employees in two provinces in China: Shandong and Shanghai, worked in various enterprises, including financial, education, IT, manufacturing and other industries confirmed that responsible leadership had a significant and positive effect on EGB. In a more recent study, a qualitative approach using two discussion groups was conducted by Lasrado and Zakaria (2020) in Dubai and Manchester which involved participants from the United Arabs Emirates and the United Kingdom. A total of 40 mixed participants from both countries were divided into eight focus groups per one discussion. These participants represented various sectors, including managers, employees and academics. Lasrado and Zakaria (2020) proposed the stimulus role of leadership as one of seven stimuli for green behavior.

Based on the promising role of leadership in influencing employee behavior, some scholars venture to understand how leaders shaped employee behavior. For example, Grojean, Resick, Dickson, and Smith (2004), defines organizational climate as the normative system for institutional planning and is intended by leaders as a guide for employee behavior through the embedded organizational practices and procedures. Supporting Grojean et al. (2004), Koene, Vogelaar, and Soeters (2002), found a clear association in their study in Netherlands stores between different forms of leadership and organizational climate. In this light, Chen, Huang, and Hsiao (2010) demonstrated that

organizational climate influenced innovativeness in employee behavior via knowledge management.

Knowledge management refers to using, sharing and creating information to achieve organizational objectives via novel approaches (Chen et al., 2010). Thus, adopting knowledge management as a mediator would open new doors to organizations to overcome current and forthcoming challenges they face, as well as provide innovative avenues to employee's to adopt green attitude in workplace (Chen et al., 2010). Fawehinmi et al. (2020) and Zhang et al. (2019) confirmed that GHRM boosted knowledge regarding the environment which in turn encouraged EGB. To elucidate, when staff gets green training, they obtain sufficient knowledge regarding the reasoning and purpose of saving the environment, which in turn exhibits EGB. When staff is rewarded based on their green performance and is involved in decision making related to environment, they are more likely to learn more about proper environmental behavior. Similarly, Ghabash et al. (2018) supported the positive mediating role of organizational learning between modest leadership and EGB.

Empirically, Tsai et al. (2017) confirmed that organizational climate had a positive, direct and significant relationship to EGB. Tsai et al. (2017) conducted their study in an environmental certified corporation using a questionnaire survey amongst 164 employees working in various departments in a Port in Taiwan. Supporting Tsai et al. (2017)'s result, Dumont et al. (2017) and Norton et al. (2014) confirmed that organizational climate significantly mediated the relationship between GHRM in the former study and policy in the latter study with EGB. In addition, Norton et al. (2017)

advocated the positive role of climate and revealed that a direct relationship between intention and EGB was significant in the case of an organization with a stronger environmental climate compared to the case of weak climate.

Based on the above discussion, the details of these studies regarding the EGB are presented in Table 2.1.

Table 2.1: Summary of determinants of EGB in previous studies

Reference	Country/ Sample	Independent variable	Moderator/ Mediator	Findings
Mesmer-Magnus et al. (2012)		• Environmental knowledge • Environmental awareness • Environmental attitudes • Environmental commitment • Personality • Motives • Values • Demographic variables • Organizational control • Organizational support • Employee commitment		• These independent variables were antecedents of EGB
Ones et al. (2015)		• Organizational intervention • Individual intervention		• The independent variables of EGB were divided into organizational intervention and individual intervention
Norton et al. (2015b)		<u>Contextual factors</u> • Institutional • Organizational • Leader • Team <u>Personal factors</u> • Between person • Within person		• The independent variables of EGB were classified into contextual factors and personal factors
Norton et al. (2015a)		• Aging		• Aging had a positive effect on EGB in some cases • Aging had a negative effect on EGB in other cases
Wiernik et al. (2016)	Eleven countries:	• Aging		• Aging had a linear relation with EGB (conserving, avoiding harm and taking initiatives)

Reference	Country/ Sample	Independent variable	Moderator/ Mediator	Findings
	• Brazil • China • Germany • Japan • Mexico • Poland • The Russian Federation • Singapore • Switzerland • The United Kingdom • The United Statas S = 4676 professional workers			• Aging had a non-linear relation with EGB (transforming and influencing others)
Weerarathna et al. (2017)	Sri Lanka S=170 respondents in manufacturing and service sectors	<u>Demographics factors</u> • Marital status • Level of education • Gender • Years of experience		• Positive association between married status and EGB • Positive association between high education level and EGB • Females showed a slightly higher level of EGB than male • More experienced employees were less capability to show EGB
George and Jayakumar (2019)	India S= 52 faculty members	<u>Demographics factors</u> • Gender • Marital status • Academic disciplines		• No significant differences in EGB based on gender • No significant differences in EGB based on marital status • No significant differences in EGB amongst the faculty members based on their academic disciplines
Mohideen et al. (2019)	India S=150 respondents from nursing and housekeeping in a medical research center	Marital status		• There was a significant difference between marital status and two types of EGB: avoiding harm and conserving resources • There was no significant difference between marital status and two types of EGB: sustaining work and taking initiative
Morton et al. (2018)	South Africa S = 313 South African respondents employed	<u>Personality traits</u> • Conscientiousness • Extraversion • Neuroticism • Openness • Positive Social-Relational Disposition		Conscientiousness, neuroticism, and negative social-relational disposition significantly predicted EGB

Reference	Country/ Sample	Independent variable	Moderator/ Mediator	Findings
	in various industries	• Negative Social-Relational Disposition		
Manika et al. (2015)	The United Kingdom S=1, 204 employees in organizations belonging to different sectors (Telecommunications, gas, electricity, financial, city council)	Internal factors • Attitude External factors • Incentives • Support		Internal factors • Attitude had a positive and significant relationship with EGB External factors • Organizational incentives had a positive and significant relationship with EGB • Organizational support had a positive and significant relationship with EGB
Tian et al. (2020)	China S= 205 employees in a wide range of jobs (accounting, administration, human resource management, banking)	• Attitude	Motivation (**mediator**)	• Attitude of individuals positively predicted EGB • Motivation mediated the relationship between attitude and EGB. Thus, motivation affected EGB
Norton et al. (2017)	Australia S=74 full-time employees in various sectors	• Intention	Organizational climate (**moderator**)	• Green behavioral intention was positively related to next-day EGB • In case of stronger green climate as moderator, the relationship between green behavioral intentions and next-day EGB was significant compared with weak climate
Klein (2015)	USA and Europe S= 274 employees	Internal motives • Intrinsic motive External motives • Incentive • Public relation		Internal motives • Intrinsic green motive was proposed as internal predictor of EGB External motives • Financial/cost considerations were proposed as external motive of EGB • Public relations was proposed as external motive of EGB
Cuifang and Rui (2019)	China S= 305 employees in various sectors. i.e.	• Green internal motivation • Green external opportunity		• Internal motivation positively influenced EGB • Organizational green opportunity as training had a positive effect on EGB

Reference	Country/ Sample	Independent variable	Moderator/ Mediator	Findings
	(service, manufac-turing, catering and construc-tion)			
Kim et al. (2019)	South Korea S=151 employees in financial organiza-tion	• Job satisfaction	Percentage of female members (**Moderator**)	• Job satisfaction positively predicted EGB • The linkage between job satisfaction and EGB was stronger amongst females
Dumont et al. (2017)	China S=388 employees in company for food packaging products	• GHRM	Organizational climate (**Mediator**)	• GHRM influenced in-role EGB only • Organizational green climate significantly mediated the relation between GHRM and EGB
Zhang et al. (2019)	China S= 145 employees of different units in various industries in China	• GHRM.	Information need (**Mediator**)	• GHRM significantly predicted EGB • Pay and reward practice (GPR) had a significant effect on extra-role EGB only • Information need mediated the effect between GHRM and EGB
Chaudhary (2019)	India S=91 employees from different hierarchical levels worked in automobile industry	• GHRM		• GHRM significantly predicted EGB • Pay and reward practice (GPR) had a significant effect on extra-role EGB only • Training practice (GTD) scored the highest score amongst all GHRM practices in influencing EGB
Chaudhary (2020)	India S= 301 employees worked in an automobile sector in India	• GHRM		• GHRM significantly predicted EGB
Fawehinmi et al. (2020)	Malaysia S= 425 lecturers at Malaysian public research universities	• GHRM	Environmental knowledge (**Mediator**)	• GHRM had no significant effect on EGB • Environmental knowledge fully mediated the relationship between GHRM and EGB

Reference	Country/ Sample	Independent variable	Moderator/ Mediator	Findings
Ghabash et al. (2018)	Iraq S= 119 employees in commercial banks	• Modest leadership	Organizational learning (**Mediator**)	• Modest leadership positively affected EGB • Organizational learning positively mediated the relationship between modest leadership and EGB
Yang (2019)	China S= 317 employees in various enterprises	• Responsible leadership		• Responsible leadership had a significant and positive effect on EGB
Tsai et al. (2017)	Taiwan S= 164 employees in Eco-Port	• Organizational green climate		• All dimensions of organizational green climate had a positive and significant relation with EGB
Norton et al. (2014)	Multiple countries S=168 employees from an online panel	• Organizational sustainability policies	Climate perception (**Mediator**)	• There was a positive relationship between an organizational sustainability policy and EGB • The mediator climate perception fully mediated the significant relationship between the presence of an organizational sustainability policy and EGB
Kongrerk (2017)	Thailand S=638 respondents worked in top environ-mental contribu-tions enterprises	• Corporate social responsibility		• Corporate social responsibility had a positive effect on EGB
Ralston (2016)	Canada S= 8 cleaners at schools from two districts	<u>External opportunities</u> • Satisfaction • Communication		• Strong sense of pride as a satisfaction in work was one of opportunities to perform EGB • Communication of goals was a crucial opportunity to drive EGB.
Lasrado and Zakaria (2020)	The United Arab Emirates + the United Kingdom S= 40 participants from various levels and disciplines	• Organizational stimuli		• Incentive • Corporate policies and regulations • Communication style change • Support systems • Role of leadership Were deemed management strategies to promote EGB

2.3 Components of this study

2.3.1 Green Transformational Leadership, G-TFL

Traditional leaders are the people who act as role models, influence followers behavior, and transfer an organizations expectations to staff via social communications (Ture and Ganesh, 2018). In both study from Robertson and Barling (2013) and Fatoki (2019) revealed that there was a significant positive relationship between environmental behavior of traditional leaders and employees PEB.

Besides traditional leadership, there are many forms of leadership that have been explored in previous studies in relation to their roles in stimulating EGB, such as transactional leadership, transformational leadership, environmental transformational leadership and green transformational leadership.

To differentiate between traditional leadership that depends on the domination of a manager and leadership that depends on the motivation of followers to adopt values, Burns (1978) introduced new concepts called transactional leadership (TCL) and transformational leadership (TFL).

According to Bass (1985), TCL refers to the interchange between a leader and a subordinate and the way where each achieves his/her self-interests (Bass, 1985; Bass, 1999). Thus, the leader of TCL concentrates on the progress of the work process rather than the type of ideas, i.e. focuses on rewards and penalty to fulfil work requirements (Bass, 1985). According to Bass (1985), TCL exhibits two characteristics; (I) use of contingent reward, (II) management-by-exception, negative feedback, and contingent aversive reinforcement. Later on, Bass (1990) expanded the characteristics of TCL into

four characteristics. (I) contingent reward: providing a promotion according to the achievement, (II) management by exception (active): searching for the differences from the standard rules and taking a corrective action, (III) management by exception (passive): interfering only once the standard is not met, i.e., waiting for a problem to emerge, and (IV) laissez-faire: giving up the authority to avoid decisions making.

Opposing TCL, TFL is an approach that makes a positive and valuable change in performance of subordinates aligning with the performance goal of the organization. This valuable change is the result of mutual motivation and morale between leaders and subordinates (Burns, 1978). Hence, a transformational leader is a leader who is able to generate from his/her subordinates an achievement which exceeds what is required via four characteristics of transformational leaders (Bass, 1985).

According to Bass (1985), these characteristics of TFL are: (I) charisma: playing on values, needs and hope of followers via dramatic speeches and convincing actions, (II) inspirational leadership: motivating followers via unintellectual and spiritual qualities, (III) individualized consideration: treating every subordinate as an individual unit by paying attention to every ones needs and concerns, and (IV) intellectual stimulation: encouraging logical and rational thinking in problem solving, imagination and beliefs.

Podsakoff, Mackenzie, Moorman, and Fetter (1990), followed by Podsakoff et al. (1996) expanded the characteristics of TFL proposed by Bass (1985) into (I) intellectual stimulation and (II) personal consideration, which were adopted from Bass (1985), followed by (III) articulating a vision: inspiring

the team's members with the vision of the organizations to overcome challenges, (IV) providing an appropriate model: providing a role model for followers to follow which is consistent with the values of the organization, (V) fostering an acceptance of the group's goals: promoting the co-operation between the group's members towards achieving the common goals, (VI) high performance expectations: high expectation of leaders to the followers performance and achievement.

To sum up, TFL is in an opposite stance to TCL. TFL is more innovative and flexible, while the leader of the TCL focuses on the described supervisory roles (Bass, 1990). Thus, transformational leaders have the ability to achieve success over failure as they can make a rapid evaluation of the status quo, and then, make an appropriate decision (Avolio, Waldman, and Yammarino, 1991). Accordingly, Bass (1990) encouraged leaders to adopt TFL over TCL style in organizations that want to make a significant change across all levels.

Several empirical works revealed that TFL was positively associated with general constructs related to an organization and followers, such as organizational innovation (Jung, Chow, and Wu, 2003; Sarros, Cooper, and Santora, 2008), a follower's job satisfaction, and a follower's job performance (Bono and Judge, 2003), a follower's development (Dvir, Eden, Avolio and Shamir, 2002), and innovation of faculty in the educational sector (Elrehail, Emeagwali, Alsaad, and Alzghoul, 2018; Woods, 2007). Likewise, with regards to the employee's environmental behavior, Jia, Liu, Chin, and Hu (2018) demonstrated that TFL had a significant and positive effect on an employee's green creativity in the medical sector in China.

With the rise in environmental awareness, Robertson and Barling (2013) adapted the concept of TFL into the environmental behavior of an organization. They put forward a new concept called environmental transformational leadership (E-TFL), or environmentally specific transformational leadership. E-TFL was defined as leaders who communicated the environmental vision of the organization to employees and behaved as per the green values themselves (Robertson and Barling, 2013). To measure E-TFL, Graves et al. (2013) adapted the four characteristics of TFL of Bass (1985) into the environmental context.

Specifically, the E-TFL has four dimensions namely: (I) the environmental charismatic leader, whom acts as a role model to share, convince and commit others to environmental values, (II) the environmental-inspirational leader, who provides a vision of the future to be compatible with international environmental demands, (III) the environmental transformational leader, who motivates employees to address the current environmental crisis in an innovative approach, and (IV) environmental leader, who evaluates the needs of each employee in order to provide a suitable learning process (Graves et al., 2013).

Using the conceptualization developed by Graves et al. (2013), many authors investigated the effect of E-TFL on PEB (i.e., Graves and Sarkis, 2018; Graves, Sarkis, and Gold, 2019; Graves et al., 2013; Kura, 2016; Z. Li, Xue, Li, Chen, and Wang, 2020; Robertson and Carleton, 2018). These studies were conducted in a wide range of geographical areas and work sectors, such as amongst employees at manufacturing companies in the United States (Graves and Sarkis, 2018), managers in Russia (Graves et al., 2019),

employees at global organizations in China (Graves et al., 2013), employees in public sectors in Nigeria (Kura, 2016), employees in manufacturing companies in China (Z. Li et al., 2020), and employees working in a variety of other industries in the United States (Robertson and Carleton, 2018). The results consistently revealed that E-TFL had a positive and direct relationship with PEB.

Additionally, some authors attempt to explain the mechanism between E-TFL and PEB by examining the role of mediators such as motivation (Graves and Sarkis, 2018; Graves et al., 2013; Z. Li et al. 2020), environmental passion (Robertson and Barling, 2013; Z. Li et al., 2020), environmental climate of co-worker (Robertson and Carleton, 2018), and environmental concern of employees (Kura, 2016). The findings of these studies revealed that the influence of E-TFL on PEB could be mediated via various mediators.

The emerging of the E-TFL concept inspired Chen and Chang (2013) to establish the concept of green transformational leadership (G-TFL). G-TFL defined as "Behaviours of leaders who motivate followers to achieve environmental goals and inspire followers to perform beyond expected levels of environmental performance" (Chen and Chang, 2013, p. 109).

Chen and Chang (2013) developed the concept of G-TFL by adapting the six characteristics of TFL from Podsakoff et al. (1996) into green behavior. In particular, the characteristics of G-TFL are: (I) inspiring the followers with the environmental plan of the organization, (II) providing the followers with the environmental vision of the organization, (III) motivating all followers to work together towards the same environmental goals of the organization, (IV)

encouraging followers to achieve the environmental goals of organization, (V) acting with considering of the environmental beliefs of followers, and (VI) stimulating followers to think in a green way (Chen and Chang, 2013).

Several empirical studies have investigated the role of G-TFL on various variables related to environment. For example, Zhou et al. (2018) held the same view of Chen and Chang (2013), despite the different samples. Both studies demonstrated that G-TFL had a positive and significant association with green product development performance (GPDP). The respondents of the Zhou et al. (2018) were governmental employees in China, while the respondents of Chen and Chang (2013) were from the electronic industry in Taiwan. Zhou et al. (2018) explained that the positive relationship between G-TFL and GPDP was mediated by a green psychological climate, while Chen and Chang (2013) demonstrated that the positive relation between G-TFL and GPDP was mediated by green creativity. From the result of both studies, it can be concluded that G-TFL can inspire the development of green products through a psychological climate (organizational factor) or green creativity of a person (individual factor).

Additionally, some studies also found that G-TFL had a direct influence on other variables related to green behavior, such as green performance (Chen et al., 2014) and green creativity (W. Li et al., 2020; Mittal and Dhar, 2016). To interpret this result, analysis is attributed to the characteristics of G-TFL that were developed by Chen and Chang (2013). Chen et al. (2014) suggested that when a leader encourages followers to behave with a green approach, employees are more likely to also exhibit a green performance. Further, W. Li et al. (2020) and Mittal and Dhar (2016), showed that when a leader

encourages followers to think of creative approaches, green creativity amongst employees increases as a result.

The previous study conducted by Chen et al. (2014) demonstrated that the relationship between G-TFL and green performance was mediated via green mindfulness and green self-efficacy, while in the study of W. Li et al. (2020) indicated the G-TFL increased green motivation, which in turn inspired green creativity. On the other hand, Mittal and Dhar (2016) revealed a connected relationship between G-TFL and green creativity as a consequence of green organizational identity. In sum, these few studies shed light on the mechanism how G-TFL influences various variables related to the environment.

2.3.2 Individual Green Values, IGV

Value is "A single belief which transcendentally guides actions and judgments across specific objects and situations and beyond immediate goals to more ultimate end-states of existence" (Rokeach, 1968, p. 16). According to Rokeach (1968), values can be an instrumental or terminal form. Instrumental values refer to the belief that guides ones mode of conduct such as being ambitious, helpful, intellectual and responsible, while terminal values indicate the judgment after a specific situation or existence such as equality, freedom, security and pleasure (Rokeach, 1973). Rokeach (1973), developed a measurement of value called Rokeach Value Survey (RVS) which comprises of 36 values to identify the patterns of values.

To overcome the long RVS, Schwartz and Bilsky (1987) mapped the 36 values of RVS into eight distinct motivational domains to build a universal structure of human values. These domains are: (1) enjoyment, (2) security, (3)

achievement, (4) self-direction, (5) prosocial, (6) restrictive conformity, (7) maturity, and (8) social power. These domains were divided as per two factors; firstly, by the interest they served (individualistic vs. collectivist) and secondly, the goal to which they referred (terminal vs. instrumental).

Accordingly, the redefinition of the value states "A value is an individual's concept of a transituational goal (terminal or instrumental) that expresses interests (individualistic, collectivist or both) concerned with a motivational domain (enjoyment, ..., ..., ..., power) and evaluated on a range of importance (from very important to unimportant) as a guiding principle in his/her life" (Schwartz and Bilsky, 1987, p. 553).

Schwartz (1992) revised the universal structure of Schwartz and Bilsky (1987) on a larger sample in twenty countries and added two new motivational values domains, which were stimulation and tradition, which resulted in a total of ten motivational domains. Besides, Schwartz (1992) updated the name of some values domains, including hedonism instead of enjoyment, benevolence instead of pro-social, and universalism rather than maturity. These ten motivational domains can be grouped into four major-broader dimensions and two bipolar value dimensions. These dimensions have been illustrated by the researcher as shown in Fig. 2.3. Self-enhancement dimension is opposite to self-transcendence dimension, and conservation dimension versus openness to change dimension. Accordingly, due to the correlation between value and its corresponding behavior as per Bardi and Schwartz (2003), examining the value-behavior relation in social issues across cultures via applying the revised theory of Schwartz (1992) has been recommended.

Many scholars conducted practical studies on the correlation between various values and their corresponding organizational behavior in the domain of social sciences. In the United States, Brown and Treviño (2006) examined the value congruence between leader and employee and its impact on deviance behavior amongst hospital employees. In China, the work values of Chinese employees were found to have a direct correlation with turnover intention amongst employees at various corporations (Wang, Chen, Hyde, and Hsieh, 2010).

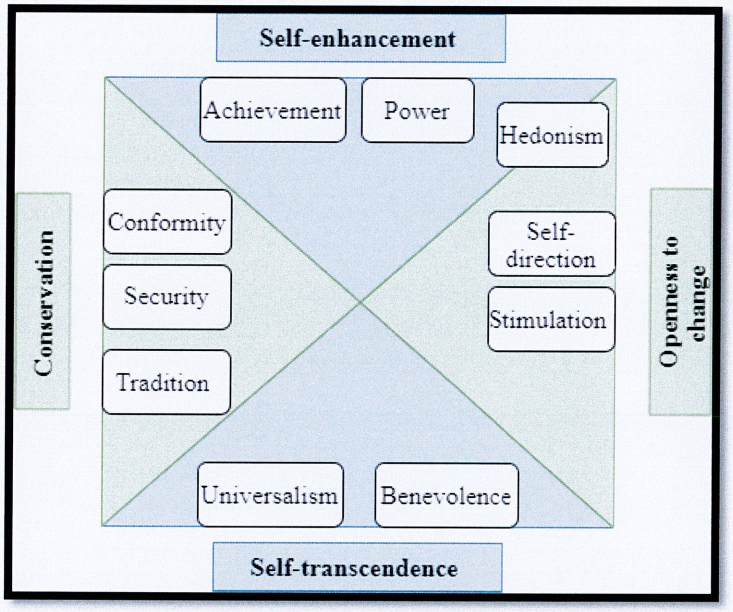


Fig. 2.3: The four major-broader dimensions and two bipolar dimensions of the revised theory of basic human value

In the context of environmental behavior, some studies examined the correlation of some values with environmental behavior, including green value co-creation and green product innovation performance in Taiwanese manufacturing companies (Chang, 2019), and green consumption value and accepting green behavior (advertising and buying) in the United Kingdom and Portugal (do Paço, Shiel, and Alves, 2019).

Zhou et al. (2018) introduced a new term called Individual Green Values (IGV) which derived from the components of Value-Belief-Norm Theory (VBN) developed by Stern et al. (1999). The work of Stern et al. (1999) was to understand the determinants of any social movement, including environmentalism. In particular, Stern, Dietz, and Kalof (1993) developed a model towards environmental concerns which consists of three value orientations, namely egoistic value orientation, social-altruistic, and biospheric. Egoistic value orientation represents self-valued objects (my health/future/lifestyle), social-altruistic represents others-valued objects (people/children), and biospheric represents non-human species valued objects (plants/animals/birds) (Stern et al., 1993). To match the major motivational domains with these new value orientations, Stern, Kalof, Dietz, and Guagnano (1995) maintained that the self-enhancement category corresponds with egoistic value orientation and the self-transcendence category corresponds with both social-altruistic and biospheric value orientations.

VBN was developed from three theories (Stern et al., 1999), namely (I) the revised Theory of Basic Human Value (Schwartz, 1992); (II) "New Ecological Paradigm" (NEP) (Dunlap and Van Liere, 1978), and (III) "Norm Activation Theory" (NAT) (Schwartz, 1977). The revised Theory of Basic Human Value identified a comprehensive set of ten distinct value domains which served as a guiding principle for numerous behaviors across cultures (Schwartz, 1992). While the NEP is a framework developed by Dunlap and Van Liere (1978) covers three dimensions related to the environment, namely: "Balance of nature", "Limits to growth", and "Human domination over nature", NAT was defined by Schwartz (1977) as the moral obligation that

motivates an individual to behave in a manner complying with ones values. There are two variables: (I) Awareness of Consequences and (II) Ascription of Responsibility introduced to explain how personal norms in NAT can be activated (Schwartz, 1977).

In other words, according to VBN of Stern et al. (1999), a behavior could be activated via a causal chain of the VBN components as per the following order: (I) values (Schwartz, 1992; Stern et al., 1993), (II) beliefs (Dunlap and Van Liere, 1978), and (III) norms (Schwartz, 1977). To elaborate, the activation of one's personal norms to act according to the social movement's values flows in this order: (I) values of movement's object, which lead to, (II) beliefs about this valued object, which is in turn drive (III) beliefs that this valued object is threatened (Awareness of Consequences) (AC) and beliefs that individuals should take action to alleviate the threat on this valued object (Ascription of Responsibility) (AR). Finally, AC and AR activate the personal norms, which lead one to exhibit a behavior.

Fornara, Pattitoni, Mura, and Strazzera (2016) adopted VBN to promote energetic transformation in private homes in order to move away from a high energy consumption towards higher green energy use via purchasing renewable energy devices. Fornara et al. (2016) demonstrated that an individual endorsing biospheric values would induce pro-environmental beliefs of individual. These beliefs will enhance the knowledge of adverse consequence of current behavior of high energy consumption as air pollution, water pollution and climate change and will enhance the felling of responsibility to take action to save the environment. Finally, this will trigger the sense of moral obligation to shift to devices with less consumption of

energy to transfer to a greener community. Overall, this example of energy transformation shows empirically the chain of VBN, connecting values, beliefs, AC, AR, personal norms, and finally performing the targeted behavior.

Zhou et al. (2018) integrated only two factors of VBN (beliefs and norms) in IGV due to the following reasons. For the value component, there is no consensus on which value orientations had a significant impact on environmentalism, while for the norm component, there was an agreement on the positive role of norm. Moreover, the component of belief has not been investigated yet sufficiently. To exemplify, on the aspect of value orientations component, the results of Stern et al. (1999) and Bidwell (2013), revealed that the altruistic value orientation played a significant and positive role on the VBN model which was in contrast to Steg et al. (2005), who confirmed that the contribution of altruistic value orientation was not significant in the VBN model. On the aspect of the norm component in environmental context, Chou (2014) revealed that norms had a positive and significant relationship with EGB. Similarly, Dumont et al. (2017) confirmed that the relationship between psychological green climate and EGB was moderated via norms. Therefore, IGV comprises two variables: beliefs and norms.

Zhou et al. (2018) defined IGV as "Green values are the result of sustainable development, which mainly refers to individual attitudes and behaviours in sustainable development" (Zhou et al., 2018, p. 5). IGV includes two dimensions: (I) environmental beliefs that refers to individual's beliefs and values in environmental concerns, and (II) environmental norms which represent an individual's values affecting their behavior.

2.4 Research Themes

2.4.1 Theme 1: EGB

The definition of EGB by Ones and Dilchert (2012) is adopted in this study since this is the only defintion that sheds lights on four attributes. Firstly, the target is employees, not organizations nor public individuals. Secondly, EGB focuses on the actual behavior of employees that is related to their work. Thirdly, EGB specifies the measurable-environmental behavior and could be evaluated/quantified by organizations. Fourthly, the definition of EGB considered both types of behavior as either beneficial or harmful (Ones and Dilchert, 2012). Accordingly, this study adopts the proposition of EGB to be studied in detail.

2.4.2 Theme 2: G-TFL with EGB

Based on the development of the mentioned studies relating to the forms of leadership in 2.3.1, the researcher of this study adopts the concept of G-TFL (Chen and Chang, 2013) over E-TFL (Robertson and Barling, 2013) for two main reasons. Firstly, there are four characteristics to measure E-TFL (Graves et al., 2013), while there are six characteristics to measure G-TFL (Chen and Chang, 2013). Thus, G-TFL gives a more detailed view for measurement. Secondly, a G-TFL definition is more comprehensive because it promotes the required and voluntary green behavior as per Chen and Chang (2013), which represents exactly the adopted dependent component in this study; EGB.

In addition, many researchers have investigated the predictor E-TFL on the green behavior of employees at their workplace as PEB or EGB, while fewer researchers have explored the role of G-TFL on constructs related to the

environment. To the best of the researcher's knowledge, investigation into the mechanism of how G-TFL leads to EGB is still scarce. Thus, this study will contribute to this gap in the literature relating on the role of G-TFL on EGB.

2.4.3 Theme 3: Mechanism between G-TFL and EGB

Zhou et al. (2018) investigated the role of IGV relating to environment sustainability. Using the sample of 52 leaders and their 214 subordinates - from both private and governmental enterprises - the results revealed that green transformational leaders instilled a green psychological climate in the organization which in turn, enhanced the GPDP. The study revealed that this relationship will strengthen when employees possess higher green values (Zhou et al., 2018). This positive and significant moderation role of IGV means "mind acts upon mind" between leaders and employees in the context of the environment, which indicates the high-intensity climate in an organization (Zhou et al., 2018). In other words, an employee with strong environmental beliefs and strong environmental norms equals an employee with high green values towards the environment meeting the expectation of transformational leaders regarding environmental protection (Zhou et al., 2018).

Interestingly, the study of Zhou et al. (2018) demonstrated that when employees have high green values, it will further shape green psychological climate in the organization, which in turn stimulates GPDP. However, Zhou et al. (2018) advocated that employee green values do not directly link to the GPDP.

Based on the existing literature, the researcher of this study would like to interpret and explain the link between G-TFL, IGV, and EGB amongst laboratories' staffs in the Kingdom of Bahrain.

2.5 Underpinning Theories

2.5.1 Theoretical Lens for Understanding G-TFL with EGB

There are many theories to explain the relationship between transformational leadership with social behavior as per the Social Exchange Theory (Cropanzano and Mitchell, 2005), AMO Theory (ability, motivation, and opportunity) (Appelbaum, Bailey, Berg, and Kalleberg, 2000), Social Learning Theory (Bandura, 1977), and Transformational Leadership Theory (Burns, 1978).

Social Exchange Theory depends on exchanging a behavior amongst individuals and not between a leader and a follower as per this study proposition. Moreover, evaluating this exchange relies on cost-benefit analysis between these two parties as opposed to a one-way direction from the leader to a subordinate in order to promote a particular behavior. Thus, there is a chance to reject this behavior by subordinates. Consequently, Social Exchange Theory is rejected for the framework of this study. Although the AMO Theory concentrates on three components: ability, motivation, and opportunity to shape the outcomes for an employee, AMO has been rejected in this study since it refers to enhancing the level of an employee's performance and not promoting a new behavior amongst employees. Moreover, these components of AMO Theory are served by organizational

efforts in general and not specifically by a leader. Thus, it is somewhat irrelevant to the components of this study.

Social Learning Theory is acquiring a new behavior via a learning process through the observation and imitating (Bandura, 1977). Therefore, in this study, the Social Learning Theory has been adopted since a follower will learn a new behavior from a leader after observing the leader's action and the desire to imitate the behavior.

Transformational Leadership Theory was initially introduced by James McGregor Burns in 1978. It is defined as a process where the leaders and their followers lift up the level of motivation and morality of each other (Burns, 1978). Later, Bass (1985) developed this theory further and formulated its mechanisms which are mentioned in 2.3.1. Thus, this new definition is the influence of the leaders behavior on the followers behavior to drive followers to perform beyond their capabilities. This influence is approached via four distinct leader behaviors called the four I's. These are "inspirational motivation, idealized influence, intellectual stimulation, individualized consideration". Accordingly, in this study, the developed Transformational Leadership Theory (Bass, 1985) has been adopted as it explains the association between transformational leadership and its influence on a followers behavior via mechanisms to perform their duties and what is beyond their duties.

2.5.2 Theoretical Lens for Understanding I-GV with EGB

There are three major theories largely mentioned in the literature regarding the association between an individual's values and a social behavior. That is,

Self-Concept Theory (Shamir, House, and Arthur, 1993), Supplies-Values Fit Theory (Edwards, 1996, 2007), and VBN Theory (Stern et al., 1999).

Self-Concept Theory is based on a personal perception of his/her abilities and traits that affect his/her attitude and behavior (Shamir et al., 1993). Since this theory focuses on self-perception of the own abilities and not the perception of external factors such as the perception of leaders' behavior, hence, this theory was not adopted in the current study.

Supplies-Values Fit Theory is based on the congruence of values between one's individual self-values and those supplied by organizations. This consistency in the same value leads to a positive effect on the corresponding behavior of employees in a workplace according to the nature of the consistent value (Edwards, 1996, 2007). However, in this study, Supplies-Values Fit Theory cannot be adopted since it depends on the congruence of values between leader and employee and not depends on the activation of transformational leaders to employee values as per the framework of this study.

Stern and his colleagues proposed that the VBN Theory is based on three theories all of which are explained in detail in 2.3.2. They are: (I) the revised Theory of Basic Human Value (Schwartz, 1992), (II) NEP (Dunlap and Van Liere, 1978), and (III) NAT (Schwartz, 1977) referes to activating the personal norms of two different beliefs, (I) beliefs that the current environmental conditions threaten the individual's values, and (II) beliefs that individuals have to adapt in order to reduce this threat (Schwartz, 1977). In other words, the causal chain proposed in VBN Theory moves from the general values to

beliefs regarding the human–environment relationship (NEP), which in turn is believed to affect specific beliefs on the consequences of environmental behavior and the individual's responsibility for these problems and also for taking corrective action. To sum up, VBN is adopted in this study to test the association between individual values and environmentalism.

2.6 Conceptual framework

This study integrates the literature of G-TFL (Chen and Chang, 2013) with EGB (Ones and Dilchert, 2012). The researcher is interested to understand the intervening mechanism of IGV (Zhou et al., 2018) between these two previously mentioned components. Therefore, the researcher proposes that G-TFL has an association with EGB. In addition, the researcher argues that this association is exerted through IGV. Eventually, G-TFL, EGB, and IGV are combined into a novel framework in this study as illustrated in Fig. 2.4.

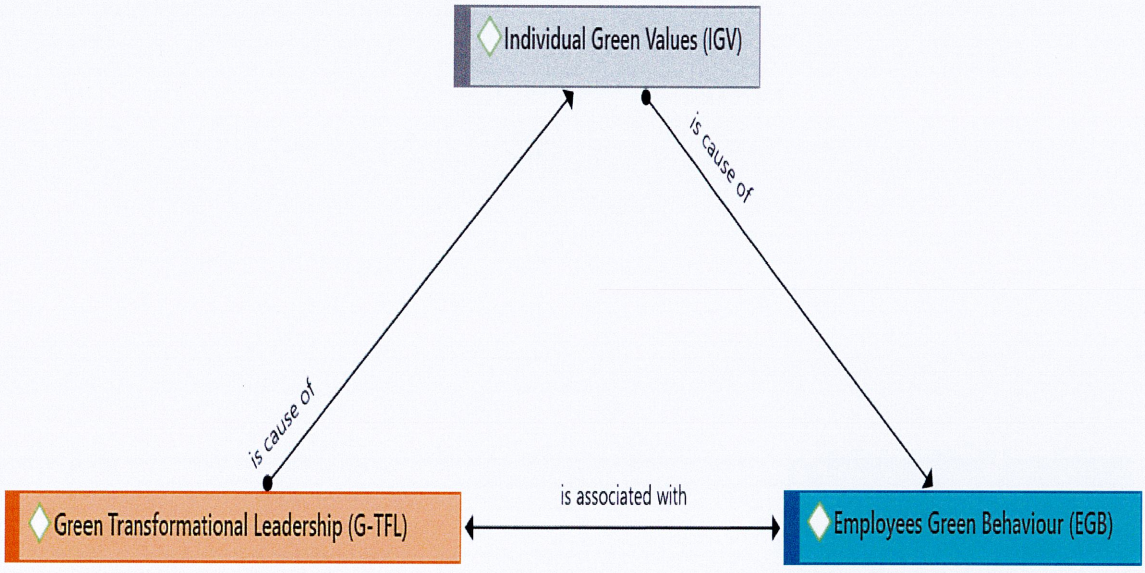


Fig. 2.4: The conceptual framework for activating the green behavior of laboratory's staff at academic laboratories

2.7 Summary

The main aim of this chapter was to review literature regarding employee environmental behavior in the workplace. EGB (Ones and Dilchert, 2012) is adopted in this study as the the main component. Based on the literature, this researcher divided the antecedents of EGB into two factors, namely personal factors (demographic factors, personal traits, and psychological factors), and organizational factors (organizational practices, organizational leadership, and organizational climate). The development of the other two components, which are G-TFL and IGV were explained. Subsequently, three themes based on the three components of this study were proposed. The supported theories and the study model were presented at the end.

Chapter 3 Methodology

3.0 Introduction

After determining the components for this study previously in Chapter 2, the practical work has been conducted to collect the data and reach the findings that achieve the study objectives. Thus, this chapter illustrates how these practical steps have been achieved. Accordingly, this chapter demonstrates the research paradigm, design and sampling method, interview questions, data collection procedure, and the analysis employed to analyze the data. Finally, this chapter explains the adopted approach to ensure the trustworthiness in this study.

3.1 Research Design

The philosophical worldview is defined as "A basic set of beliefs that guide action" (Creswell, 2009, p. 24). The constructivist worldview indicates that every individual has his/her own understanding for the whole world as a result of his/her life and work. This understanding is subjective to the personal experience (Creswell, 2009). Thus, the researcher's intent was to look at the participant's view for the phenomenon of green behavior in laboratories and the constructivist worldview has been adopted in this study.

This study used a qualitative method in order to describe the experience of green behavior of laboratory staff, to describe the influence of G-TFL on their green behavior and to understand the mechanism on how G-TFL influences the EGB of the laboratory staff. The qualitative research design is a manner with which to describe and understand the core experience of an individual or

group of people regarding a human problem. In addition, the qualitative research enables the researcher to question and analyze the collected data inductively from particular to general cases (Creswell, 2009). Thus, the rationale for choosing a qualitative research method is that it is the best approach to describe the phenomenon of green behavior in laboratories in detail and even with a small sample size since it can capture any themes that emerge during the data collection.

Phenomenological approach describes the "Meaning for several individuals of their lived experiences of a concept or a phenomenon" (Creswell and Poth, 2016, p. 57). To elaborate, the phenomenological approach enables the researcher to capture core events, including feelings, emotions, thoughts, perceptions, actions and judge as phenomenology to describe the essence of experience (Castillo, 2018). Accordingly, since phenomenology concentrates on the common experience of a specific phenomenon amongst all participants to reach a universal understanding of their experience and how they experienced it, this study used a phenomenological approach to capture how participants describe every component and the relationships in the framework of this study.

Finally, this research adopted the constructivist paradigm to explore the experience of employees regarding green behavior in laboratories together with their perception regarding the behavior of G-TFL in influencing their green behavior. A qualitative inquiry for the phenomenological approach has been adopted.

3.2 Research Population, Sampling and Selection

The population of this study is employees who work in laboratories in the Kingdom of Bahrain. Overall, in the Kingdom of Bahrain, laboratories located in higher educational institutions such as University of Bahrain, Arabian Gulf University, Applied Science University, Ahlia University, Kingdom University, Gulf University, and Bahrain Polytechnic. In addition, laboratories also can be located at medical research centers such as Al-Jawharah Center for Molecular Medicine, Royal College of Surgeons in Ireland, Medical University of Bahrain, and King Hamad University Hospital as well as at governmental organizations such as The Supreme Council for Environment and Agriculture and Marine Resources. Nevertheless, the information of exact number of employees who work in each laboratory, their positions, and names could not be determined despite several attempts have been made by the researcher to obtain this information from human resource departments. To overcome this issue, the researcher made a random estimation based on informal information with some contacts who work in laboratories. Based on the information given, it was estimated that each laboratory employed about 20.

Given that the exact numbers of the population cannot be determined, hence, the purposive sampling technique was employed. Such technique is considered as non-probability sampling, which the participants who can give deep insight into this topic were chosen based on the recommendation of Petty, Thomson, and Stew (2012). According to Petty et al. (2012), the purposive sampling technique enables the researcher to obtain rich

information that could deepen the researcher's understanding regarding the topic and to serve the purpose of the study.

The sample selection criteria for this study were based on their job tenure and nature of the job scope. The participants must have at least one year working experience in laboratory. According to Batool, Parveen, and Batool (2017), bank employees must have at least one year of experience to ensure work performance. Similarly, 45% of the sample of nurses in Jordanian hospitals that showed a high job performance have at least one year of experience (Al-khasawneh and Futa, 2013). This criterion of one-year experience is to ensure acculturation with the workplace. In addition, the participants must be directly involved in laboratory daily operations such as organizing and labelling chemicals, conducting experiments, cleaning and maintaining equipment, and adhering to waste disposal policy. These two criteria were essential to help the researcher collect related information to answer the research questions. These selection criteria also ensure the homogeneity of the responses which is crucial in a qualitative study as per Creswell (2009).

Alase (2017) recommended obtaining the acceptance of the interviewees participating in the study. Thus, the researcher sent an invitation letter to these staff who meet these said criteria via email as shown in Appendix A to seek their approval. Within a week, twelve individuals responded with an acceptance to participate in this study. After collecting the data from nine of the participants, the data reached was saturated. According to Alase (2017), the sample size of participants in phenomenological research can be between

two to 25 and the saturation is the critical point by which to stop adding more participants. Thus, the researcher decided to proceed with nine participants.

Accordingly, the researcher conducted in-depth interviews with the nine participants. All of them are working in academic laboratories, either governmental, higher educational institutions or research laboratories. Aliases have been used for all interviewees to protect their confidentiality. P1 is used for participant 1 and P2 is used for participant 2 and so on.

3.3 Questionnaire Structure

Participants were asked three main questions, followed by five to seven associated sub-questions for every main question to explore the main phenomenon of the study as shown in Appendix B. Since the qualitative research describes the essence of the participants' experiences, the research questions commenced with exploratory verbs such as 'what or how' for describing or listing factors respectively. To exemplify, participants were asked their experiences regarding this phenomenon (description) and how a situation or context affected their experiences regarding this phenomenon (factors)? (Alase, 2017; Creswell, 2009; Creswell and Poth, 2016). In this study, the researcher formulated research questions that embedded the information the researcher intended to understand in addition to asking open-ended questions to encourage participants to talk freely and elaborate on their responses (Alase, 2017).

As mentioned, an invitation letter was sent to said participants to obtain their agreement to participate in this study. After receiving their reply, an email with the interview protocol was sent to them. The interview protocol outlined

the steps and procedure of the interview so they could prepare themselves with sufficient ideas and thoughts regarding the study topic. The interview protocol is shown in Appendix B.

The interview protocol provides information regarding the background of the researcher and informs the participant of the study topic and purpose, their rights to withdraw from participating at any time and the protection of their identities.

After the introduction, some ice-breaking questions were put forward. These icebreaker questions were designed to encourage participants to talk freely about something familiar and to generally encourage them to engage in discussion, including information regarding the nature of remote work conducted during the isolation periods of the COVID-19 pandemic compared to the normal practice of physically attending their place of employment.

From there, the researcher introduced the main body of the study containing the main three questions of the research with their sub-questions. The main questions were designed around the three main components; (I) experience of laboratories' staff regarding green behavior in their workplace, (II) factors of G-TFL in affecting their green behavior and, (III) the mechanisms engaged in by the leader to transfer green behavior to laboratories' staff.

Before ending the session, the researcher asked some demographic questions (Appendix C) and also asked if they would like to add any additional information or recommendations.

Finally, the researcher concluded the session by thanking the participants for their time and opinion. The details of this interview protocol are presented in Appendix B.

The following are the three main questions:

Q 1: What is the meaning of green behavior for staff at academic laboratories?

Q 2: How does the green transformational leader/supervisor affect the green behavior amongst staff at academic laboratories?

Q 3: How do the individual green values interfere between green transformational leadership style and employee green behavior for staff at academic laboratories?

3.4 Data Collection

An in-depth interview technique was employed to acquire pre-determined areas of information with which to guide the researcher to determine the interest of the interviewee in the study (Petty et al., 2012). The conclusion of interviews occurred when the collected data reached saturation and the information received became redundant (Creswell, 2009).

Due to the prohibitive circumstances of the COVID-19 pandemic and its preventive measures, the interviews were conducted virtually over the internet application called Zoom Video Communications, in short 'Zoom'. The data collection via the virtual interviews was conducted over the month of September 2021, at the time that was convenient for all participants as they were able to choose a time that best suited them. The timetable for all the interviews is shown in Appendix D.

Overall, nine in-depth interviews were conducted. On average, each interview took approximately one hour. All interviews were audio-recorded using the feature of the Zoom software to record meetings. The researcher earned the approval from the participants to record the interviews, as this mentioned clearly in the invitation letter (Appendix A). Moreover, before starting the interviews, the researcher informed them again that the interviews will be recorded, as this mentioned also in the interview protocol (Appendix B). The audio records were saved in a MP4 format. The template of notes for each participant is shown in Appendix E. Notes were taken by the researcher to be utilized later during analysis, in addition to enabling the researcher to follow up on the key terms of responses and any emergent ideas during the interview in order to formulate the following question.

3.5 Data Analysis

To analyze phenomenological data, Creswell and Poth (2016) mentioned two steps; (I) horizonalization; quoting the significant talk of participants, (II) clustering; combining the similar ideas which are known as sub-codes into code, then combining the similar codes into a theme. Similarly, Alase (2017) suggested that the procedure of data coding requires three cycles; firstly, coding meaningful chunky sections as a significant statement, secondly, moving to core meaning called code and thirdly, narrowing down to a theme. While Petty et al. (2012) stated that in thematic analysis, the researcher should listen to data several times in order to become familiar with data and write notes and reflections during analysis.

In qualitative studies, inductive analysis is used to go from a particular case to a general case and thus creates a theory for a grounded theory design or pattern for phenomenological design at the conclusion of the analysis (Creswell, 2009). Although this study adopted upfront theories that are mentioned in Chapter 2 and used them as a guideline to interpret the data and organize it, an inductive thematic analysis was applied to allow themes to emerge in this phenomenological study.

Accordingly, this study adopted the thematic analysis as a method of data analysis. The audio records were stored in dual places since Alase (2017) stated that data storage and management is the responsibility of the researcher who must maintain the security of the data. As stated above, analysis of data comprises multi-steps. It is an iterative process as opposed to a linear sequential process. It includes going backwards and forwards several times to add, edit, merge, replace and cancel. Commencing with listening to the data several times and taking notes and moving on to label quotations. Codes were given for similar labels to identify similarities, causes and patterns. Finally, codes were grouped to create multiple themes, which formulate the key findings. The created themes, codes and subcodes will be illiustrated and defined in detail and presented in Chapter 4.

Data coding was completed in October 2021 and data analysis in November 2021. The researcher used the computer-assisted qualitative data analysis software; ATLAS.ti 9 to perform the analysis of audio data. The audio data has not been transcribed since the interviews were done in Arabic and English. Thus, it was difficult to tanscribe both languages into one text documnet. The

researcher sought to understand and interpret the data based on items established by scholars in the field.

At conclusion, the reseacher highlited the significant quotations and phrases from the audio recorded interviews via the aid of ATLAS.ti 9 software. The researcher then went back and forth during the thematic analysis to refine the results until themes settled. For every question, several distinct themes and codes have emerged as illustrated in detail in Chapter 4.

3.6 Role of the Researcher

The researcher is the primary instrument of data collection in qualitative research. Thus, this situation requires a clear recognition of the researcher's value, background and bias from the outset (Creswell, 2009).

Although all objective criteria have been considered to avoid bias, it is still possible bias affected how the researcher interpreted the data. The researcher formulated the themes based on established items by scholars in the field as guidelines as mentioned in Chapter 4. In addition, to minimize the researcher's bias on the finding of this study, some techniques of trustworthiness were used to increase the integrity of the research findings, as mentioned in the section 3.7.

3.7 Trustworthiness

As outlined by Petty et al. (2012), transferability is one of four criteria to ensure trustworthiness in the quality of qualitative research. It refers to the applicability of the findings in other contexts or with other participants.

Transferability can be checked via thick description and purposive sampling (Petty et al., 2012).

In this study, the thick description has been completed via the illustration of the sufficient quotations and demographic information of the participants. This is to create a context for the reader to recognize the situation at its whole and to obtain a deeper understanding for the phenomenon (Creswell, 2009). In addition, the purposive sampling method has been chosen in this study.

Thus, these two procedures, which are thick description and purposive sampling confirm the trustworthiness of the findings and improve the validity of this study.

3.8 Summary

This chapter presents the method that has been used in this study to explore the nature of green behavior in academic laboratories, in addition to understanding the factors that may promote such a behavior on the aspect of leadership and personal value. The researcher employed the qualitative method based on the constructivist paradigm, by conducting in-depth interviews with nine participants for approximately one-hour at a time and the participants were recruited based on their job tenure and nature of the job scope in laboratories. The data was analyzed using the inductive reasoning and thematic analysis by external support from the qualitative analysis software called ATLAS.ti 9. All the previous key points of information of Chapter 3 are summarized in Table 3.1 as below.

Table 3.1: Summary of adopted methodology

Methodology	Details
Philosophical worldviews	Constructivism
Strategy of inquiry	Phenomenology
Research method	Qualitative/cross-sectional
Method of reasoning	Inductive reasoning
Questions	Open-ended questions
Sampling method	Purposive sampling
Data collection technique	Virtual interview with Zoom
Type of data	Primary data
Format of data	Audio data
Method of analysis	Thematic analysis
Tool of analysis	ATLAS.ti 9
Interpretation	Themes, codes, sub-codes interpretation
Validity	• Use rich, thick description • Use purposive sampling

Chapter 4 Findings and Thematic Analysis

4.0 Introduction

The previous chapter presented how data was collected. This chapter illustrates the demographic information of the participants and the thematic analysis for data obtained to answer the three questions. Particularly, sub-codes, codes and the themes for all components in this study are presented in detail. Based on the findings, a summary for the whole framework of this study is illustrated at the conclusion of this chapter.

4.1 Participants

The demographic information of the participants in this study has been illustrated in Table 4.1. As shown, five participants possessed a Bachelor's degree and four participants completed their Master's degree. This highly educated sample supports the findings of George and Jayakumar (2019) and Weerarathna et al. (2017), they emphasized the positive association between the education level of respondents and the exhibiting of green behavior. Out of the nine participants, there were seven technicians, one research assistant and one senior technician. Five participants worked more than 20 hours per week, while three participants worked from 16 to 20 hours per week and one participant worked between 11 to 15 hours per week. In terms of working experience, the majority of the respondents had more than four years of working experience in laboratories. This average tenure period supports the argument of Norton et al. (2015a) and Weerarathna et al. (2017) that longer experience means less capability to perform green behavior due to preferring to stay in a comfort zone and resisting to change. The majority of participants

were between 26-30 years old, three participants were between 36 to 40 years old, while only two participants were between 31 to 35 years old. Lastly, all participants were female. The gender in this study is in line with the studies of Kim et al. (2019) and Weerarathna et al. (2017), who revealed that females are more inclined to green behavior than males.

Table 4.1: Demographic information of participants

Participant	Education level		Job title		Working hours per week		Years of experience		Age		Gender	
P1	Bachelor's Degree		Technician		16-20 hours		1-3 years		26-30 years old		Female	
P2	Master's Degree		Technician		More than 20 hours		More than 10 years		36-40 years old		Female	
P3	Bachelor's Degree		Technician		16-20 hours		1-3 years		26-30 years old		Female	
P4	Bachelor's Degree		Research assistant		11-15 hours		7-10 years		31-35 years old		Female	
P5	Master's Degree		Senior technician		16-20 hours		More than 10 years		36-40 years old		Female	
P6	Bachelor's Degree		Technician		More than 20 hours		1-3 years		26-30 years old		Female	
P7	Master's Degree		Technician		More than 20 hours		7-10 years		26-30 years old		Female	
P8	Bachelor's Degree		Technician		More than 20 hours		More than 10 years		36-40 years old		Female	
P9	Master's Degree		Technician		More than 20 hours		4-6 years		31-35 years old		Female	
Total	Diploma Degree	0	Technician	7	Less than 5 hours	0	1-3 years	3	20-25 years old	0	Male	0
	Bachelor's Degree	5	Research assistant	1	5-10 hours	0	4-6 years	1	26-30 years old	4	Female	9
	Master's Degree	4	Senior technician	1	11-15 hours	1	7-10 years	2	31-35 years old	2		
	Ph.D.	0			16-20 hours	3	More than 10 years	3	36-40 years old	3		
					More than 20 hours	5			41-45 years old	0		
									46-50 years old	0		
									51-55 years old	0		
									56-60 years old	0		
									Over 60	0		

4.2 Themes of EGB

The first research question was to explore the extent of the participants green behavior in academic laboratories. Based on the Green Five taxonomy developed by Ones and Dilchert (2012), then updated by Ones et al. (2018), the taxonomy of green behavior comprises of five meta-categories and 17 categories. These five meta-categories are considered themes in this study, then, the categories become the foundation to extract the codes and sub-codes from the data obtained in order to describe the participants green behavior in the laboratories. Eventually, after analyzing the data of this study, five themes, 12 codes and 31 sub-codes were obtained. These themes are (I) transforming, (II) conserving, (III) avoiding harm, (IV) influencing others, and (V) taking initiative.

4.2.1 Transforming

This main theme contains four codes, which are (I) EGB- Eco-innovation, (II) EGB- Implementing, (III) EGB- Optimizing and (IV) EGB- Alternatives.

For (I) EGB- Eco-innovation, which refers to creating novel innovations in order to maintain the environment. This code contains two unique sub-codes which are producing energy and water treatment. P9, participant working as a technician in excess of four years, confirmed that she worked on projects to convert waste to energy and to clean sea water. For example, P9 said that regarding producing energy:

"Recently, a new research lab was established in 2019, it is specialized in converting waste to energy, like food waste, animal waste, and we also use

oil waste. So, we apply multiple experiments to see how we can generate energy from waste. Some of them were successful and already published in journals".

P9 added that regarding the water treatment: "*I worked on one project using the application of material science, like getting rid of dyes from water and removing heavy metal from water*".

For (II) EGB- Implementing, refers to adopting new approaches as a preventive procedure to decrease the impact of current negative behavior. It is considered as a pre-action and contains two sub-codes, namely: stimulants and sustainability. P5, who holds a master's degree and works as a senior technician, said that she adopted the use of stimulants for organisms to decrease the appearance of diseases, and later, to decrease the usage of antibiotics as these drugs may decrease the efficiency of the immune system of these organisms, which in turn leads to an imbalance in the plant and animal lifecycle. P5 revealed regarding the stimulants:

"*We used to use a high quantity of antibiotics and chemicals as Formaldehyde and Formalin to treat some seasonal diseases, but later, we adopted a new protocol to treat them by adding nutrients. So, before the disease appears, we already stimulated the immune system of these organisms. Thus, we decrease the emergence of diseases, which leads to, decreasing the usage antibiotics*".

While P2, P3, P4, and P5 emphasized the importance of adopting sustainable behavior in the consumption of water, electricity and reagents. This is

achieved by using highly efficient devices to save the natural resources. For example, P3 said: "*I wish, we can reduce the amount of water that we use daily and reduce consumption of electricity by replacing some of current devices by similar one in efficiency but less in electricity consumption*". Confirming this opinion, P5 said: "*The electricity should automatically shut down when no one in the place, I mean the light, A/C and ventilation system. Computers are adjusted to shut down at 3 p.m. exactly*". Emphasizing the same idea of sustainability in laboratories, P4, who works as a research assistant about 11 to 15 hours per week, said:

"*I wish that when we compare quotations for any order, because every year we buy devices and equipment for labs, we choose the ones with less consumption to energy and the ones with light plastic if something is single use plastic, there are two kinds of plastic, standard and lightweight. We should order the light one. We should try to choose something which is more eco-friendly, like that*".

For (III) EGB- Optimizing, it refers to changing how work is being conducted to become more compatible with the environment. It contains two sub-codes, demonstration and quantity. Regarding the sub-code: demonstration, P4 expressed that one demo is enough for some experiments to show students the concepts of the idea. P4 said that:

"*Due to the increase in number of students, we could not increase number of sets per lab, number of fume hoods per lab, so we run the experiment only once as a demo instead of running the experiment for each student or each group*".

Regarding the sub-code: quantity, it refers to a considered usage of resources. This was mentioned by P5, P6 and P8, and it includes preparing stock solution for all students to ensure there is no wasting of any excess solution, adding the solvent solution to ensure the accurate use of chemicals, and decreasing the number of gloves used. For example, P6, who had one year as a technician, said: "*We have been done excessive use of gloves, so, for this purpose, we are trying to limit, roll out that every person can use like eight gloves, pair of two in a day. So, by that, it may decrease*".

For (IV) EGB- Alternatives, refers to researching a better substitute from the currently available choices. It contains four sub-codes, Formalin, Mercury, Plastic and Silver nitrate. The usage of these items has been replaced due to their harmful impact on the environment. Regarding the sub-code Formalin, its consumption was replaced due to availability of using alternatives.

"*Formalin was used here in the center as much as using the water. I was intended to reduce its usage. In the past two years, the consumption of Formalin has been decreased to the half due to my initiative to find an alternative and raise their awareness to its negative impacts*", said P5.

P2, who has a master's degree and works as a technician for more than ten years, twice supported the opinion of P5 in finding an alternative. Particularly, P2 agrees with changing experiments that require Mercury and replacing them with another more suitable chemical. For example, P2 said:

"*We stopped the experiments that require Mercury and exchanged them with alternative experiments to achieve the same goal of curriculum and at*

the same time to avoid its toxic effect. In very urgent cases, we use it in a very few quantities and a very few concentration".

Regarding the sub-code: Plastic, as mentioned by P1, P3, and P4, glass was used instead of plastic to support the environment. For example, P4 said: "*In one of my projects, we use glass tubes, glass is already usable, and at least we can use it again. Thus, we decrease the plastic waste*".

Regarding the sub-code: Silver nitrate, which is a dangerous chemical, P8, who works as technician for more than 20 hours per week and her age is between 36 to 40, stated that it has been used in a very small amount. For example, P8 said:

"*Silver nitrate is used for the courses of first year of students. You know, sometimes, we have 70 sections for one course. Could you imagine how much chemical every section will need? So, now, we use traces only and the result is obvious*".

In conclusion, participants opted for transforming behavior 20 times through creating, embracing, changing and choosing the option that benefits the environment, indicating the importance of changing the current situation for the benefit of the environment.

4.2.2 Conserving

This main theme consists of four codes; (I) EGB- Reducing use, (II) EGB- Reusing, (III) EGB- Repurpose, and (IV) EGB- Recycling.

For (I) EGB- Reducing use, refers to decreasing the quantity used of any particular item. It contains four sub-codes, chemical, electricity, paper and plastic.

For the sub-code: chemical, P1, P2, P3, P5, and P8 asserted using only the necessary amount of chemical. This would therefore save the disposal of waste down a drain or paying disposal companies to collect waste. In addition, there should be an educated and informed assessment of the necessary volumes required at the commencement of the semester in order to save on budget expenditure allowing for alternative items to be purchased. An example of such, P3, who holds a Bachelor's degree and works as a technician, said:

"*In the beginning, I found during the next day of lab's experiment excess amounts of what I prepared for students in the previous day. So, I paid attention to the required volume per experiment and to number of students per section*".

Confirming the sub-code of reducing the usage of chemicals, P5 said: "*If we can kill the parasites for further analyses by a small concentration of chemicals, why we use a high concentration! Thus, we reduce quantity of used chemicals*". Supporting this idea, P8 said:

"*Because the new devices of analyses become more accurate and more sensitive, we found that a small amount of a reactant is fine to run the whole*

experiment. So, we decrease the quantity of used material, like instead of using five grams, now we use two and half grams".

For the sub-code: electricity, P1, P2, P3, P4, P5, P6, P8, and P9 emphasized their behavior in reducing the usage of electricity of lights, devices such as the fume hood, computers and microscopes. For example, P5 said: "*Regarding devices that need a huge electricity, we do not turn them on unless we want to use them*". Advocating this concept, P1, who worked as a technician, said:

"*I make sure that every appliance in lab is turned off after the end of duty, I turn on the fume hood only during mixing reagents, not during the whole lab. Ummm, I keep the PC on save mode or switch it off, so it will not be on during overnight. I turn off the lights when there is no work or students in lab and turn off devices when there is no running work*".

For the sub-code: paper, P6 confirmed using the online system instead of the old-manual one and purchasing recycled paper instead of new synthesized papers. These two behaviors were undertaken to reduce consumption of paper. For example, P6 said: "*When we have to buy a whole sheet of papers, we exchange in regard of recycled papers. This means we are benefiting ourselves by giving the recycled paper instead of a money and buying a new recycled sheet*".

For the sub-code: plastic, P1, P3, and P4 insisting on reducing the amount of plastic used by not purchasing single disposable items or using glass instead of plastic to reduce plastic usage. For example, P1 said: "*I always try to reduce*

using the harmful plastic. Instead of using plastic bottles, I shifted to the usage of the glass bottles". Supporting P1, P3 said: "*We use glass items instead of plastic ones, because we can use the glass more than one time, but for the plastic, we use it only one time*".

For (II) EGB- Reusing, which refers to using the same item repeatedly for the same function before disposing of it. It contains three sub-codes, paper, plastic, and solutions.

For the sub-code: paper, P2, P3, and P5 asserted that they use both sides of paper. For example, P5 said:

"*We use a huge number of papers in our work. Usually, I write on the backside of paper to reuse it again. We already use it again to write a draft or a note. Why do not we use both sides? For printing, now I print on both sides. Why do we use one side and already will dump it in rubbish at the end?*".

For the sub-code: plastic, P1, P5, and P7 stated that they reuse the same plastic item again and again, such as the slides under the microscope after sterilizing them and refilling the original plastic bottles from stock of the same reagent. For example, P5 said: "*I used to reuse the slides that already were used under microscopes after washing them by Ethanol. Once it can be reused again, I will reuse it. But for the stained one, I dispose them*".

For the sub-code: solutions, P3 stated that she uses solutions planned for a current experiment again in future experiments if they are not spoilt. For example, P3 said: "*We used to use the excess pre-prepared solutions in next*

experiments as long as they are valid to be used again and would give the same result".

For (III) EGB-Repurpose, it refers to using the same item again for a different function before disposing it. It contains one sub-codes: chemical. P8 mentioned the use of some reagents for some objectives that differ than the objectives for which they were originally intended. For example, P8 said: "*We use Acetone in some experiment as a reactant. Then, we get Acetone with some traces as a result. We usually use this produced form of Acetone for different purposes, like washing glassware*".

For (IV) EGB- Recycling, which refers to creating a new product out of the remains of the original product. It contains three sub-codes: chemical, glass and paper.

For the sub-code: chemical, P8 supported the idea of modifying the resulted products from one experiment to be used later on as a starting point in a separate experiment.

"*We work on various experiments. The product of one experiment can employ in another experiment as a starting material. We use the product of the first reaction as a starting point for another experiment*", P8 said.

For the sub-code: glass, P2 mentioned that the role of big companies in the Kingdom of Bahrain to receive glass, then reproduce a wide range of items, made from recycled glass. For example, P2 said: "*Now, we collect the broken*

glass separately. Then, we send them to companies for using them in recycling".

For the sub-code: paper, P6 confirmed the idea of recycling paper, especially in departments that consume large volumes of paper to obtain the maximum benefit. For example, P6 said:

"*As we are using excessive papers, actually we recycle our papers. You cannot trash them directly to the waste bin. We have a special box to collect the used papers, not dumping them, this box goes directly for recycling companies*".

In conclusion, participants emphasized the behavior of conserving via reducing, reusing, repurposing, and recycling 36 times due to the importance of preserving the natural resources in the environment.

4.2.3 Avoiding Harm

This main theme contains two codes. The codes are (I) EGB- Pollution and (II) EGB- Strengthening ecosystem.

For (I) EGB- Pollution, which refers to preventing all causes of pollution. This code contains four sub-codes, which are chemicals, glass, radioactive and detrimental items.

For the sub-code: chemicals, many participants mentioned chemical disposal as part of waste management, including P1, P3, P4, P5, P6, and P7. They declared that there are waste collection containers for each of the different

chemicals and from there; they were sold to waste disposal companies. Moreover, they asserted that they avoided mixing the different chemicals together to prevent hazardous reactions and also avoided draining the chemicals in sink, particularly the organic chemicals. For example, P7, who works for more than 20 hours per week as a technician, said: "*Previously, we were disposing chemicals in sink, surely, this was an incorrect behavior. Now, there are specific companies to collect these wastes of chemicals to dispose them properly*". Advocating this opinion, P1 said: "*We do not throw the waste solutions into the drain, maybe they are carcinogenic or radioactive, so we throw them in specific containers*".

"*We deal with organic chemicals in biochemistry labs in a different manner than other chemicals. We do not drain them in sink as others, there are specific containers for them. Also, the hazardous and biological waste, not be added to the general waste*", P4 said to support the proper disposing of chemicals.

For the sub-code: glass, P1, P2, P3, P4, and P6 mentioned proper disposal of glass as part of waste management. They illustrated that there were specific containers for broken glasses storage that was to be sold to external disposal companies by the kilo. For example, P1 said: "*There are specific containers to collect the damaged glassware to avoid mixing them with general waste*". Supporting the same idea for the disposal of glass, P6 said: "*For sharp things, we have a specific container, or boxes available, and it is in each department. Upon National Health Regulatory Authority (NHRA) guideline, we change the boxes every 28 days*".

For the sub-code: radioactive, P9 mentioned the importance of disposing radioactive waste properly. For example, P9 said: "*We have nuclear labs, also in some labs, we use X-ray, so, we have a radioactive waste in this field. For that, we have specific containers for these kinds of waste to avoid their leaking*". Moreover, P9 stated that it is very important to properly deal with samples in the laboratory as some are toxic, radioactive or may leak. Thus, cautious procedures are required for staff safety. For example, P9 said: "*We enter the radioactive labs with a special pen or a special coat to measure the radiation and detect if there is any amount of leaking. No one can enter these labs without such protectors*".

For the sub-code: detrimental items, there is a need to use enormous amounts of laboratory consumable apparatuses. P4, P5, and P6 confirmed that they are detrimental items and negatively impacted the environment. These items include gloves, tissue, pipette tips, droppers, Pasteur pipettes, centrifuge tubes, cotton swabs, petri dishes, and cuvettes. For example, P5 said: "*Especially in medical lab, to avoid contamination, we use tremendous amount of plastic tubes to collect samples. Also, the gloves, I could not find a solution to reduce using them. We use them in a massive way*". Supporting the same idea, P4 said: "*Every single piece is composed of plastic and we use them in a huge amount in microbiology and molecular biology lab, we change the gloves many times in every lab*". Using gloves is important to protect the researcher or staff, but at the same time, tremendous amounts of gloves are used.

"*As you know, this is a lab organization, and as such, we use an enormous quantity of gloves far exceeding what is necessary. I'm saying that*

because all the time you are wearing the gloves and when you deal with sample, you say ohhhh it is contaminated, you just remove the gloves and take a new one. As we are dealing with patient's blood and you never know which sample is infected, so gloves are one of the most important things in our lab that have to be there, you have to wear it every time because you are dealing with blood samples, sometimes urine sample and stool sample", P6 said.

For (II) EGB- Strengthening ecosystem: which refers to repairing or recovering from damage occurred to the environment. This code contains two sub-codes, they are a) sterilization and b) maintenance and repair.

For the sub-code: Sterilization, P1, P2, and P4 asserted the importance of this process to avoid any contamination in the laboratories. This means sanitizing laboratory equipment by using the autoclave machine with a high temperature and high-pressure steam to kill or deactivate microorganisms in order to avoid contamination. For example, P2 said: "*We put all items that need to be sterilized in autoclave for the sterilization process first, then we throw them*". Advocating this opinion, P4 said: "*Especially in microbiology lab and molecular biology lab, there are tremendous amount of petri dishes with microbes, we autoclave them firstly*".

For another sub-code: Maintenance and repair, which refers to prolonging the lifespan of equipment by repairing problems as they occur or using them as spare parts. P1, P5, P7 and P9 confirmed the importance of checking equipment and the pipe network to avoid any leakage or problems. For example, P5 said: "*We check the temperature of all equipment daily in the early morning to ensure no recording of a high temperature or no interruption*

in electricity supply overnight. Also, at the end of workday, all lights are turning off". Supporting the idea of using old equipment for spare parts, P9 said: "*We have some devices which are very old, maybe from 80s, or older than this, ok. We do not throw them directly in garbage, we keep them in the store and make maintenance for them or use them as a spare part like resistors*".

In conclusion, participants emphasized the behavior of reducing damage on environment by preventing pollution and strengthening the ecosystem 28 times due to the importance of preventing the detrimental impact of negative behavior on the environment.

4.2.4 Influencing Others

This main theme contains one code, which is (I) EGB- Educating and training.

For (I) EGB- Educating and training, which refers to spreading green behavior amongst other individuals. This code contains two sub-codes, which are students and colleagues.

For the sub-code: students, many participants confirmed sharing knowledge related to the environment with students, including P2, P3, P4, P7, P8 and P9. Participants declared that they taught students to behave properly by training them to estimate the exact proportions of necessary reagents, trained students regarding correct disposal methods, trained students to adhere to the necessary and correct environmental standards, presented educational seminars to share this information and used labels with guidelines on solutions and benches.

"*We are eager to teach students to switch off electricity when the equipment is not in use, not switch on and off multiple times. You know, students used to keep all devices on during the two hours of lab and also for the next lab; they say we leave it on for the next section. But this means that devices will be on about one hour without using. We raise awareness among students, we teach them the sources of renewable energy. Periodically, we conduct workshops for students at universities and even students at schools. We went many schools. Last time, there was a collaboration with other ministries, ok. Last summer, we conducted a workshop aimed at women in collaboration with a club. Every time we concentrate on a specific topic, such as wind energy, solar energy, and water energy. Sometimes, we were trying to ask students to work on a specific project as recycling. So, we try to raise awareness among students and let them join workshops in a specific topic. Definitely, this happened after arranging with the heads in my work*", P7 said.

For the sub-code: colleagues, P5, P6, P7, and P9 confirmed sharing environmental knowledge amongst their colleagues. They stated that they attended online courses to remain updated with state-of-the-art techniques and shared this knowledge with their friends. They provided their colleagues with alternative protocols, encouraged them to attend conferences, workshops and internships. For example, P5 said: "*We usually travel to China to attend courses there. Also, I like attending online courses. That let me pay attention to eco-toxicology to reduce the quantity of used antibiotic*". Supporting the idea of encouraging colleagues, P6 said: "*I'm a researcher too, I publish papers too. So, whenever I publish a paper, my lab colleagues are just very amazing by what I published. I'm telling ok, I have this research; this is*

relative to our work. Like this, I encourage them to learn new thing from literature review. So, by this, we share knowledge by each other".

In conclusion, sharing environmental knowledge with others, be they students or colleagues was emphasized 15 times by participants. This behavior ensures all updates are passed on to all members of each department.

4.2.5 Taking Initiative

This main theme contains one code, which is (I) EGB- New programs.

For (I) EGB- New programs, which refers to starting a new approach as a personal initiative for the sake of saving the environment. This code contains two sub-codes, which were additional containers and collect plastic.

For the sub-code: additional containers, P1 recommended adding new containers in the laboratory to collect not only laboratory material, but also student personal staff waste such as paper, plastic and metals for students in every laboratory.

For the sub-code: collect plastic, P5 took an advanced step and started to personally collect personal plastic from students and peers. For example, P5 said: "*One staff in our lab was responsible to bring the container of collecting plastic, then, return it back to a recycling company by end of every month*".

In conclusion, personal sacrifice by initiating two new programs for the sake of the environment was repeated only twice by participants via additional

containers and plastic collection. This taking initiative behavior bears a lot of risks and requires personal courage.

In conclusion, after analyzing the data, five themes, a total of 12 codes and 31 sub-codes emerged. Approximately one third of these sub-codes fell into the conserving theme. The second one third of these sub-codes fell into the theme of avoiding harm. The last one third of sub-codes was divided between the remaining three themes of transforming, influencing others and taking initiative.

Table 4.2 demonstrates all themes, codes, and sub-codes of EGB with their definitions. Fig. 4.1 shows the combination of all themes with their codes and sub-codes in a hierarchical diagram. Fig. 4.2 illustrates which participants mentioned every sub-code. Appendix F shows the diagram of every EGB theme separately.

Table 4.2: Themes, codes, sub-codes of EGB with their definitions

Theme	Definition	Code	Definition	Sub-code
Transforming	Changing the current status (process or product) to a more sustainable one	EGB- Eco-innovation	Generating sustainable solutions	EGB- Eco-innovation- producing energy
				EGB- Eco-innovation- water treatment
		EGB- Implementing	Adopting sustainable solutions	EGB- Implementing- stimulants
				EGB- Implementing- sustainability
		EGB- Optimizing	Changing the current procedures	EGB- Optimizing- demonstration
				EGB- Optimizing- quantity
		EGB- Alternatives	Choosing a sustainable option	EGB- Alternatives- Formalin
				EGB- Alternatives- Mercury
				EGB- Alternatives- Plastic
				EGB- Alternatives- Silver nitrate
Conserving	Preserving natural resources by avoiding excessive use	EGB- Reducing use	Minimizing use	EGB- Reduce- chemical
				EGB- Reduce- electricity
				EGB- Reduce- paper
				EGB- Reduce- plastic
		EGB- Reusing	Using an item again for the original function	EGB- Reuse- paper
				EGB- Reuse- plastic
				EGB- Reuse- solutions
		EGB- Repurpose	Using an item again for another function	EGB- Repurpose- chemical
		EGB- Recycling	Converting an item into a new one	EGB- Recycle- chemical
				EGB- Recycle- glass
				EGB- Recycle- paper
Avoiding Harm	Mitigating the negative impact of behavior on the environment	EGB- Pollution	Preventing behavior that damages the environment	EGB- Pollution- chemicals
				EGB- Pollution- glass
				EGB- Pollution- radioactive
				EGB- Pollution- detrimental items
		EGB- Strengthening ecosystem	Repairing existing damaged tools	EGB- Strengthening ecosystem- Sterilization
				EGB- Strengthening ecosystem- Maintenance and repair
Influencing Others	Sharing environmental knowledge with others	EGB- Educating and training	Enhancing others' environmental information	EGB- Educating and training- students
				EGB- Educating and training- colleagues
Taking Initiative	Taking advanced steps for the sake of saving the environment	EGB- New programs	Launching a new program to address environmental issues	EGB- New program- additional containers
				EGB- New program- collect plastic

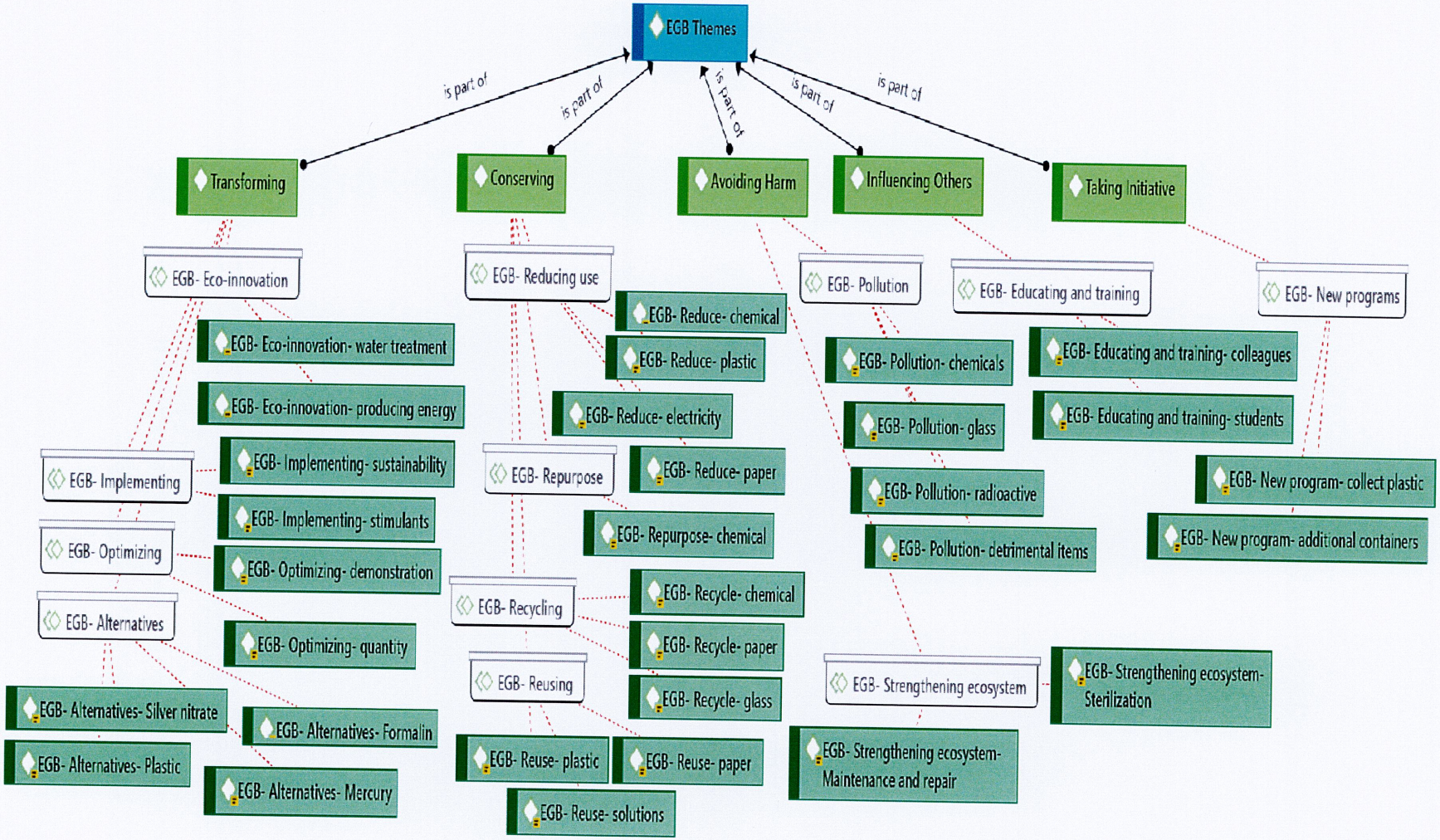


Fig. 4.1: Combination of all themes of EGB

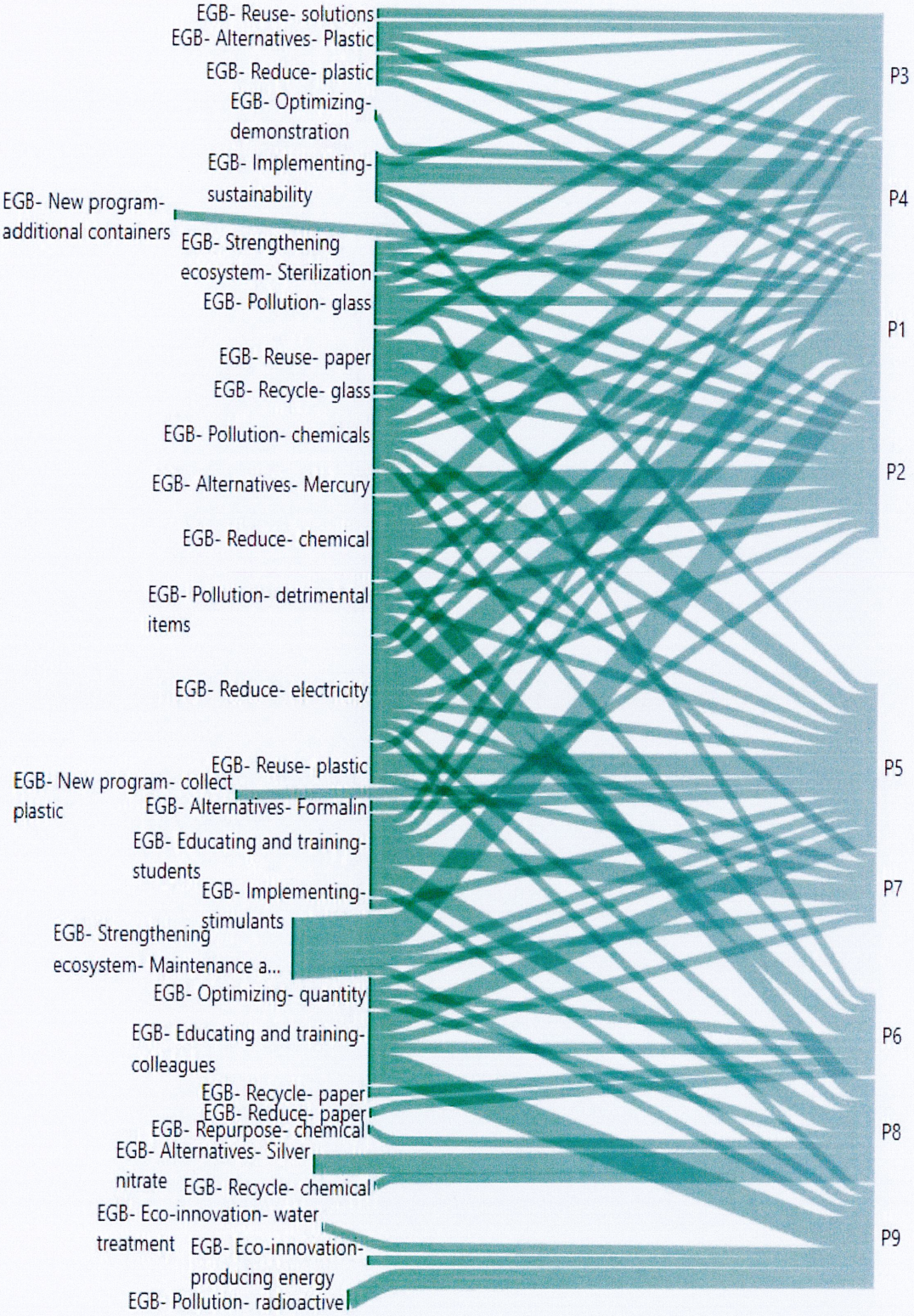


Fig. 4.2: The frequency counts (repetition) of EGB sub-codes amongst participants in a Sankey diagram

4.3 Themes of G-TFL

The second research question was to explore the impact of G-TFL on the green behavior of participants in an academic laboratory. Based on the mechanisms of transformational leadership behavior established by Podsakoff et al. (1996), Chen and Chang (2013) in turn created the G-TFL scale incorporating these mechanisms into a green behavior domain. G-TFL comprises of six main actions which are considered as the main themes in this study. Accordingly, data of this study was categorized into these six themes. These themes are (I) visioning, (II) encouraging, (III) group goal, (IV) high performance expectation, (V) individual support, and (VI) intellectual stimulation.

4.3.1 Visioning

Under the theme of visioning, three codes are revealed: (I) G-TFL- Seeking information, (II) G-TFL- Seeking opportunities, and (III) G-TFL- Launching initiatives.

For (I) G-TFL- Seeking information refers to the traits of the G-TFL namely: active learning, active listening and operations analysis.

Active learning refers to the ability of a leader to continuously learn new information in order to deal with the emergent situations as confirmed by P2, P5, and P8. For example, P2 said: "*Supervisor should be more knowledgeable and aware to the new approaches into this field*". Supporting this thought, P2, P8 said: "*Supervisor is more knowledgeable about the correct and incorrect behavior. So, he informs followers with the correct way to follow*". P2

elaborates that "*If the supervisors do not care about the new development, we will face difficulties to convince them with the importance of new issues*".

"*My supervisor is very cautious. She examines them firstly, read the manual and safety sheet firstly to see how to deal with them optimally, then, she trains us how to use them properly*", P5 said.

While P2, P5, P6, and P8 asserted the importance of leaders listening carefully to the inquiries, problems and desires of their followers and taking actions accordingly. For example, P2, mentioned the importance of listening to followers, said: "*Supervisor will make a great impact if he/she listens to our suggestions to do this thing in this way or to decrease using this chemical. It is better if he/she encourages us to give suggestions, then, apply these suggestions*". Thus, P6 complained about the absence of listening to junior staff. She said: "*I have seen in some labs, juniors are just like juniors. They do not listen to them. It is happening like that. Although they can provide solutions, their opinions are overlooked*".

For the sub-code, operations analysis, P3 and P6 stated that it is important for a leader to possess the necessary analytical skills to make decisions accordingly. This includes a leader becoming involved at the appropriate time and understanding the how, where and why of each process.

"*The leadership I'm having around is really good leadership, because if anything happened in the lab, actually, that leader tries to manage by herself, and if it is not manageable, then she is going to consult the head of the lab. But she tries to figure it out, what happens, how happens, how we can*

tackle it. What else, leaders have some quality that let them know how to lead their team on every aspect. If a team's member has done mistake intentionally or unintentionally, leader should know how to handle the situation", P6 said.

For (II) G-TFL- Seeking opportunities, which refers to the approach a leader adopts when overcoming problems that arise, such as seeking an alternative.

Many participants stated that their leaders provide them with a list of alternative solutions to avoid harming themselves and the environment instead of the original and detrimental solutions used. Moreover, their leaders give staff permission to find alternative solutions when a problem arises. For example, P9, mentioned that the role of the leader was to find a solution for the high consumption of electricity problem that they face in laboratory. P9 said: "*Our supervisor submitted a proposal to support renewable energy projects*". Advocating this P9, P3 confirmed that her leader encouraged them to order items that are suitable for the environment; eco-friendly items, such as glass instead of single use plastic. For example, P3 said: "*She buys products that are friendly for the environment*".

"*My supervisor tells us that if we find any reagent has a detrimental impact on our health and on the environment, we can change the protocol or find an alternative for this reagent. Try to find a solution. So, we start dealing with some chemicals in different way. I try to search and find approaches/remedies, which are friendly for environment. The main goal of our lab yearly is finding environmentally friendly remedies. Especially that the season for cultivating organisms from sea will soon be upon us. So, the use of antibiotics will increase, which largely pollutes the sea*", P5 said.

For (III) G-TFL- Launching initiatives refers to launching new projects for the benefit of the environment. This code contains two sub-codes, which are reduce plastic and waste management.

For the sub-code: reduce plastic, P6 stated that her leader limited the number of gloves utilized to reduce plastic consumption. For example, P6 said: "*Every staff has a limit: eight pairs, one pair for two gloves, per day*".

For the sub-code: waste management, P3 and P4 agreed that the action of their leaders to initiate a proper system to manage the disposal of waste created a significant shift to their behavior in laboratories. For example, P3 said: "*We were throwing waste into drain. Now, after the new instructions, there are special containers for every kind of waste, with labels for title, date, amount and staff on duty*". Supporting P3, P4 said: "*Now, there are containers for every type of waste in every lab and every floor for staff and students, separated plastic, glass, food. Previously, they were not there*".

In conclusion, participants emphasized that a leader possessing a vision of change for the current situation could be achieved through seeking information, seeking for opportunities, and launching initiatives accordingly. These actions were mentioned 20 times which confirms the importance of formulating a vision for the organization consistent with international-environmental goals.

4.3.2 Encouraging

The theme of encouraging contains two codes. These are (I) G-TFL- Advising and (II) G-TFL- Motivation.

For (I) G-TFL- Advising, which refers to guiding and leading staff by a leader to achieve the goals of the organization. This code contains two sub-codes, which are guiding and model.

For the sub-code: guiding, P4, P5, P6, P7 and P9, all asserted the important role of their supervisors in reminding them of correct behavior by adding stickers, labels, arrows on doors and benches etc. in order to remind staff of the correct behavior was useful. For example, P6 said: "*We have everything on benches, all these specific guidelines, you know, for working thing out, using of reagents, disposing of them, hand hygiene, the personal hygiene and your hygiene during the lab*". Confirming the opinion of P6, P5 said: "*The leader taught us the correct way in using some chemicals*".

"*This is to save the environment, how to open the yellow box, and when it is full, how you will close the box in order to keep the environment safe from the germs and everything. The leader has already set everything before. It is about what we have to follow and how we keep ourselves in safe environment*", P6 talked about the correct disposal of containers that stored sharp glass as instructed by her supervisor.

For the sub-code: model, P4, P5, and P6 mentioned the importance of leaders as role models so staff look to him/her and imitate their actions. For example, P4 said: "*If the supervisor personally applies the proper behavior, followers under his/her supervision, of course, apply the similar or the same practice*".

"*Being a role model is a big responsibility, I see my seniors as my role models as they perform the duties, as they manage the lab, and as they do for*

every kind of behavior. They are like perfect in their behaviors right now. How they are performing the work, how they are telling me this is a good way to proceed, this is not a good way to proceed", said P6 explaining that the correct behavior of her leader can inspire her to imitate her leader's behavior.

For (II) G-TFL- Motivation, which refers to driving followers to accomplish the organizational goals via intrinsic motives or extrinsic motives. This code contains five sub-codes, which are recognition, certificate, praising, monetary rewards and empowering.

For the sub-code: recognition, P5 stated the importance of declaring staff with the highest achievement or the winning team in a competition in a meeting as an extrinsic motive. For example, P5 said: "*Motivating other sections by announcing the positive achievement. Like, this month, this section decreased usage of plastic or this section consumed that amount of electricity and so on*".

For the sub-code: certificate, P1 and P6 mentioned that awarding a certificate for the best accomplishment was considered as an extrinsic motive. For example, P6 said: "*Having a certificate means, you know, the certificate itself means you are achieving something honestly. If anybody tells you, you will be certified or you will get a certificate, which is like assuming that the something that you have done is good. So, giving a certificate is like YESSS*".

For the sub-code: praising, P1 and P6 stated that thanking staff for what she/he has done made her/him feel good which in turn boosts their performance. This praising was considered as an extrinsic motive.

"*The most important thing with the human nature, like if it is doing a good work, it should be appreciated. Ok, if you are appreciated, if you are rewarded, it is a human nature, I'm telling you honestly, if I'm appreciated like, yes, you did this well; you handled this nicely, ok. This is the encouragement. If it is given to me, or is given to any other person, he/she will be encouraged*", P6 talked about the importance of appreciation for good behavior at work.

For the sub-code: monetary rewards, P2 mentioned the importance of financial reward as an extrinsic motive to drive staff to behave properly in the future. For example, P2 said: "*Getting a financial incentive on the successful idea will motivate us to work hard in the future*".

For the sub-code: empowering, P5 and P6 mentioned that giving authority to staff was considered as a praise since it gave them the feeling of pride to move forward and help others. For example, P5 said:

"*When my supervisor noticed my concern for the environment in our department, he gave me the green light to do anything for the benefit of the environment. He informed other staff to follow my instructions. So, if anyone asked me, I explain for him/her everything in details and I try to provide them with supported references. This is how my supervisor built a trust between me and other staff, which enhanced the situations. Also, when I was appointed to the cost rationalization committee, I suggested some procedures as a primer for A/C to shut on and off on the time of employee's duty to reduce the amount of electricity bill*".

In conclusion, participants emphasized the importance of encouraging followers by advising or motivation them, either with intrinsic or extrinsic motives as they repeated the actions under these two codes 18 times.

4.3.3 Group goal

This main theme contains only one code, which is (I) G-TFL- Working together.

For (I) G-TFL- Working together, which refers to encouraging all staff to achieve the unified goal of the organization. This code contains three sub-codes. The three codes are coordination, inclusiveness and teamwork.

For the sub-code: coordination, P4 and P9 asserted the importance of co-operation with staff in other laboratories in the same department and also other departments in order to share knowledge, instead of starting from scratch and then, likely applying what others do.

For the sub-code: inclusiveness, P6 confirmed the importance of equality amongst all the members of one laboratory by their leader. For example, P6 said: "*Leadership should be neutralized. No partiality depending upon religion or look or anything*".

For the sub-code: teamwork, P6 mentioned that spreading the concept of team spirit amongst laboratory's staff by a leader was recommended. For example, P6 said: "*The most important thing is teamwork, if the team is working good, the team is sharing knowledge, if the team is having the good communication, they can bring a good work to the lab. They respect and understand the result*

and any kind of discussion regarding the procedure of the work or the way they are doing it. This is the main thing that should be there among them".

In conclusion, participants declared four times that developing an attitude of group work was important in motivating staff to work cohesively in order to achieve the goals of an organization.

4.3.4 High performance expectation

This main theme contains one code. The code is (I) G-TFL- Projection.

For (I) G-TFL- Projection, which refers to putting high expectations for the running process in laboratory and for the behavior of staff. This code contains two sub-codes. These are continuous improvement and assessing staff's behavior.

For the sub-code: continuous improvement, P5, P6, and P8 confirmed the importance of monitoring the environmental impact of all operations and experiments in laboratories. This is to discover any emergent issue from the beginning and fixing it to ensure high productivity and a positive result. For example, P5 said: "*There should be a strict evaluation of the used quantity before giving the next permission of purchasing. This is to see the effect of new policies if we are in the right track or not*". Advocating the role of continuous improvement, P6 said: "*In our organization, every month, the policy and guideline have been revised by our leaders. When it has been revised, they will check, ok, that what our work procedure is following? Is there any mistake or not? If there is a mistake, they will tell us to change it*".

"*Controlling how every step is done, like one round of staff will established all the correct system of labeling chemicals and wasting containers and so on. So, the leader should ensure that all future staff is aware enough to these procedures and if they apply these rules or not. Like, disposing chemicals and how the balance is used*", P8 refers to all work being continuously improved by the leader.

For the sub-code: assessing staffs' behavior, P3, P4, P6, P7, and P8 confirmed the role of leaders in appraising employee's performance regarding the environment. For example, P4 said: "*At least, there should be a follow up. Did they surely ensure that staff apply all instructions? Is there shortage or less applying? Then, taking actions according to the rules of work*". P6, supporting the role of the leader to discuss the performed behavior with a staff member, P6 said: "*My supervisor takes responsibility. If a staff member is wrong, she advices accordingly. If they are correct, she encourages him/her*".

"*Leader can change the behavior of staff by taking actions. Like if he sees one staff that does not follow the instructions, he gives him a notice. This happened many times ago. Maybe not from the first time, or maybe give an advice nicely, but later on, a warning*", P8 refers to giving a warning to staff who did not follow the rules.

In conclusion, participants confirmed the importance of improving the current work policy three times to assess how the work was proceeding and its impact on the environment. Moreover, participants asserted the importance of evaluating the green behavior of staff six times to improve the situation in laboratories.

4.3.5 Individual support

This main theme contains one code. This code is (I) G-TFL- Consideration.

For (I) G-TFL- Consideration, which refers to providing support for every laboratory staff according to his/her needs. This code contains one sub-code, which is personal needs.

For the sub-code: personal needs, P6 mentioned the importance of the supervisor dealing with individual staff members according to their background, knowledge, and emotional state four times. For example, P6 directed her talk to the leaders regarding how to deal with a large number of staff with a different perspectives:

"Not everybody will be the same, not everybody will have the proper behavior, not everybody having the same comfortable zone. So, leader should know how to deal with all different kinds of persons. Supervisor has to be a bit emotional and fits the emotions in general. Not only to show that I want her to do the work. But actually, feeling means maybe this one is not feeling good? Maybe something she has? Ok, I know that there are some people who are like lazy people. But, leadership, you know, they are directly asking them or add their support every time to push them to do the work. In some points, she will say ok, just finish and go for those people. But the leader has to do something accordingly. From my insights, leader will have the iron of each and every person. Each leader should be responsible for his actions toward other people. How they are dealing? Like, are their dealing is rude? You know, some people are very rude to you. So, I just want to tell those people, understand each other, if your understanding is good, your working will be

fine. That happened in our home, because our parents understand you no matter what you are doing. They will understand you, but outside, not everybody will understand you. Some people will have the same mentality; some people will not have the same mentality. Those who are with not the same mentality will cause a problem in your life. So, that thing you have to sort it out. The understanding is main factor".

In conclusion, dealing with every staff member as an individual case was one of the leader's responsibilities. This was repeated four times to provide every staff with exactly what she/he requires to achieve the organizational goals.

4.3.6 Intellectual stimulation

This main theme contains one code, which is (I) G-TFL- Thinking green.

For (I) G-TFL- Thinking green refers to the action of motivating laboratory's staff to rethink all the steps in their work in a manner to save the environment. This code contains two sub-codes. These two codes are self-educating and workshop.

For the sub-code: self-educating, P6 confirmed that a leader encourages staff to update their information from external sources such as scientific papers. For example, P6 said: "*As we consider the environment in our lab, and as we deal with diseases, so whenever there is a new thing is happening, I do not know about it, I was encouraged by my supervisor to read about this disease. This encourages me to read new things*".

For the sub-code: workshop, many participants, including P1, P2, P4, P5, P7, P8, and P9 asserted the significant role of attending workshops, seminars, training and conferences as a chance for them to develop their skills. For example, P1, would like her supervisor to give her permission to attend seminars related to sustainability, say: "*Wishing to attend more seminars to inspire us with new techniques in recycling*". Confirming P1 opinion, P2, admitted the positive role of workshops and said: "*Comparing the previous status to now, there are substantial advances in lab work. Thanks to our chief of technicians for what she taught us in workshops*". Moreover, P9, mentioned the fundamental role of international workshops. She said: "*Our supervisor organized for a training in a collaboration with an international university for all staff in my department*". Advocating the great impact of external workshops, P5 said: "*Staff in my department traveled to China and Taiwan to learn new techniques and usually they apply them when they come back*".

In conclusion, participants repeated providing staff with intellectual sources to enhance their knowledge 14 times, since they believe it leads to substantial development in their behavior. This could be done through self-education or attending external workshops.

Finally, after analyzing the data, G-TFL contains six themes as factors to promote EGB amongst laboratory's staff with a total of nine codes and 21 sub-codes. Approximately one third of these sub-codes fell into the visioning theme. Another one third fell into the encouraging theme. Finally, the remaining one third of sub-codes were divided amongst the remaining four themes, which were group goal, high performance expectation, individual support, and intellectual stimulation.

Table 4.3 demonstrates all themes, codes and sub-codes of G-TFL with their definitions. Fig. 4.3 shows the combination of all themes with their codes and sub-codes in a hierarchical diagram. Fig. 4.4 illustrates which participants mentioned every sub-code. Appendix G shows the diagram of every theme of G-TFL separately.

Table 4.3: Themes, codes, sub-codes of G-TFL with their definitions

Theme	Definition	Code	Definition	Sub-code
Visioning	Ability to formulate a vision, based on the status quo and then, finding ways to achieve this vision	G-TFL- Seeking information	Availability of specific characteristics in a leader to manage the organization and staff well	G-TFL- Active learning
				G-TFL- Active listening
				G-TFL- Operations analysis
		G-TFL- Seeking opportunities	Addressing the current challenges	G-TFL- Alternative
		G-TFL- Launching initiatives	Creating effective programs	G-TFL- Reduce plastic
				G-TFL- Waste management
Encouraging	Supporting followers with all they need in order to help them to achieve the environment-al goals of organization	G-TFL- Advising	Ability of leader to guide staff to achieve the organizations' goals successfully	G-TFL- Guiding
				G-TFL- Model
		G-TFL- Motivation	Encouraging staff to achieve objectives via recognition or reward incentives	G-TFL- Recognition
				G-TFL- Certificate
				G-TFL- Praising
				G-TFL- Monetary rewards
				G-TFL- Empowering
Group goal	Developing the spirit of team players amongst staff	G-TFL- Working together	Fostering all staff to work for the same environmental goal	G-TFL- Coordination
				G-TFL- Inclusiveness
				G-TFL- Teamwork
High performance expectation	Maintaining the best performance	G-TFL- Projection	Continuous appraisal of the outcomes of processes and staff behavior to assess the impact on the environment	G-TFL- Continuous improvement
				G-TFL- Assessing staffs' behavior
Individual support	Acting with consideration for personal background	G-TFL- Consideration	Behaving with a consideration of the personal background	G-TFL- Personal needs
Intellectual stimulation	Stimulating staff to use their minds	G-TFL- Thinking green	Providing staff with the resources to adapt their thinking towards environmental awareness	G-TFL- Self-educating
				G-TFL- Workshop

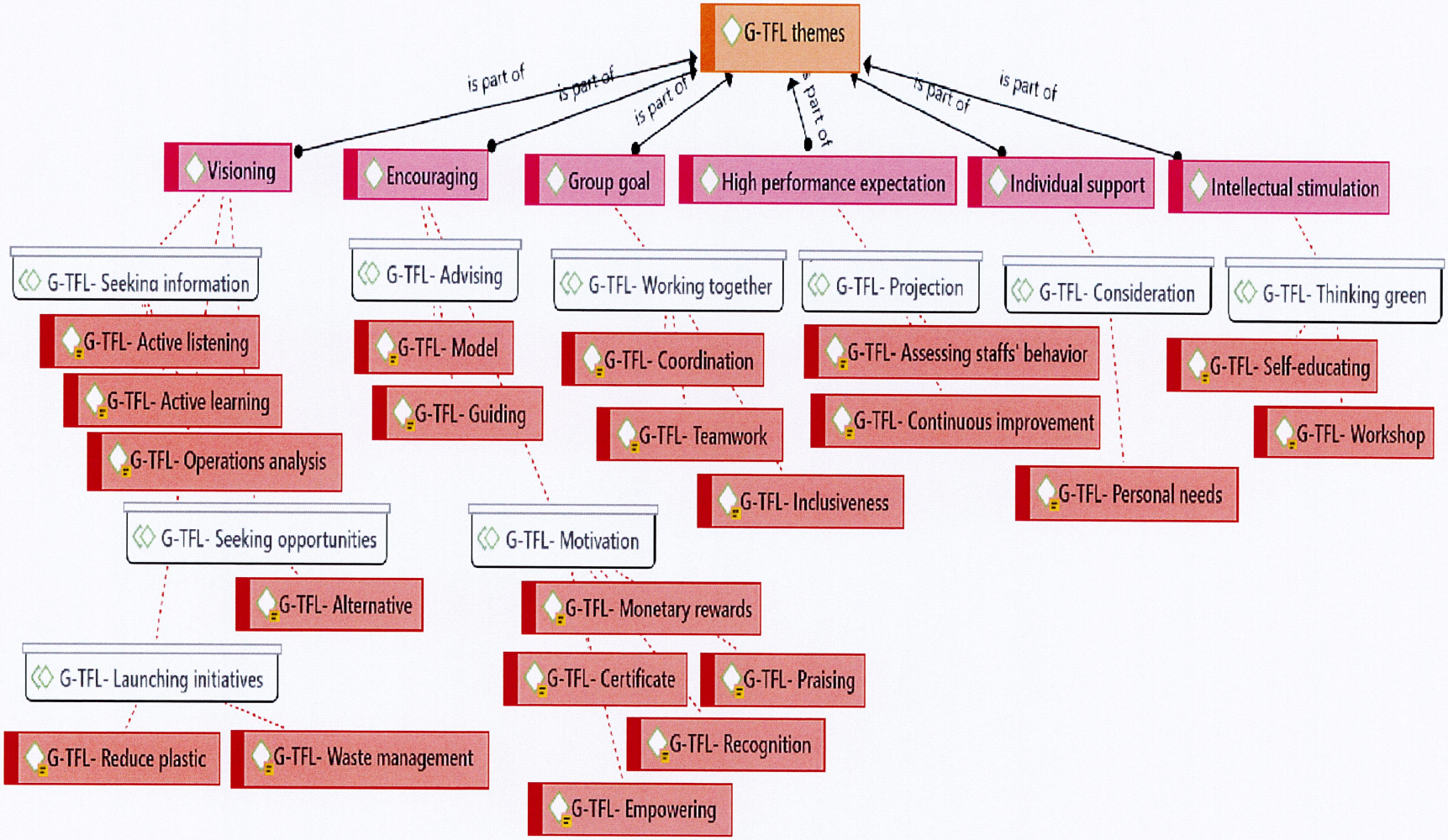


Fig. 4.3: Combination of all themes of G-TFL

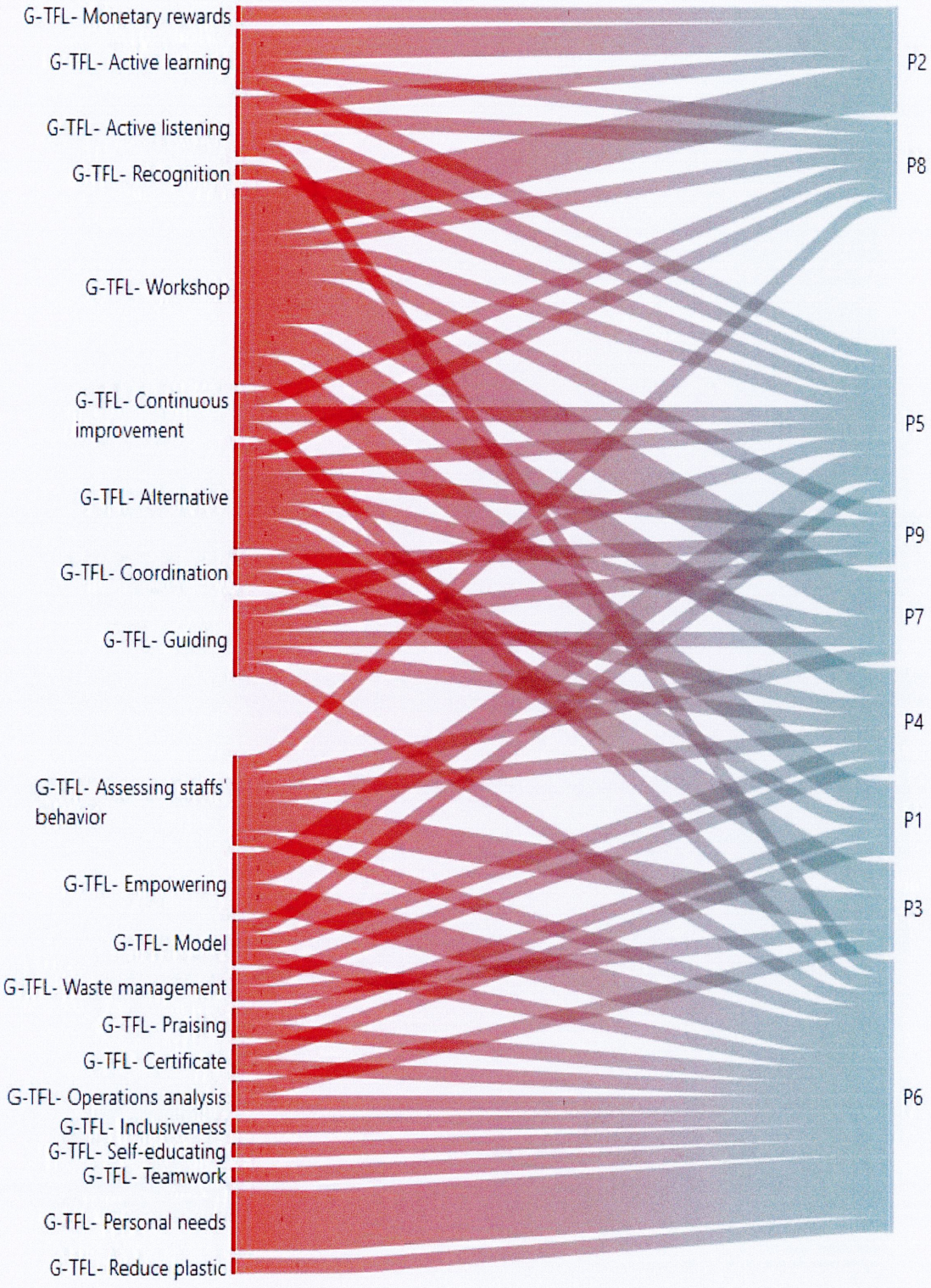


Fig. 4.4: The frequency counts (repetition) of G-TFL sub-codes amongst participants in a Sankey diagram

4.4 Themes of IGV

The third research question was to describe the mechanism of how G-TFL can influence EGB amongst laboratories' staffs. Based on the VBN Theory that originated by Stern et al. (1999) and IGV developed by Zhou et al. (2018), IGV comprises of two main branches: beliefs and norms. These two branches were considered in this study as themes. Codes and sub-codes were developed to describe IGV, followed by the third theme which refers to G-TFL mechanisms and their impact on these beliefs and norms.

After analysing the data of this study, three themes, seven codes and 14 sub-codes were obtained. These themes are (I) personal beliefs, (II) personal norms, and (III) mechanisms of G-TFL on IGV.

4.4.1 Personal beliefs

The theme of personal beliefs contains two codes, (I) IGV- About environment and (II) IGV- About self.

(I) IGV- About environment refers to the thoughts of individuals regarding the current status of the environment. This code contains one sub-code which is harming the environment.

For the sub-code: harming the environment, P1 and P5 believed that air pollution, water pollution, and the COVID-19 pandemic were currently the major pollutants. To elucidate, P1 stated that chemical evaporation from industry is the main reason for polluting natural air with toxic emissions. Moreover, P1 stated that disposing of industry byproducts in water bodies

such as seas, rivers, and oceans pollutes these natural resources with carcinogenic and radioactive pollutants. While P5 declared that all preceding efforts to save the environment reversed during the COVID-19 pandemic. This is due to the precautionary measurements against the spreading of Corona virus, including using single-disposable items of plastic in huge numbers. For example, P5 said: "*Due to precautions of COVID-19, everyone prefers using single-use items. Unfortunately, COVID-19 moves us backwards in saving environment. Especially in gatherings, the consumption of plastic becomes horrible*".

For (II) IGV- About self refers to the thinking from individuals regarding how they can personally affect the environment. This code contains one sub-code, which is influencing others.

For the sub-code: influencing others, many participants emphasized the fundamental role of instilling good values in early childhood towards the environment by family members and schools' teachers. For example, P1 confirmed the role of family during childhood and said: "*We should instill these values into our kids from childhood. Because when someone becomes old, it is very difficult for him to change his usual behavior, even if it is a bad behavior. Younger ages are easy to gain a right behavior*". P4, supporting P1 and the substantial role of her family to recycle when she was a child, said: "*This behavior came from my parents. I saw them keeping aside all items to use them again. Our store has many things we do not need them now, but we will use them in the future. We do not throw anything, even if it is damaged, we can use it in another way*". P4 continued her talk about the role of schools and said: "*There is a responsibility on schools, they open kids' eyes that there*

is another form of life. Maybe not all of them can pay attention for it. But until they grow up, they will look after this form of life".

"*It is from your home itself. You know, maybe your parents are guiding you. From that, if you have been trained like that, this happened to me also. If I go to, like, go to a mall, if I see something is open, my mind will start triggering me to close it. I got this behavior from home*", P6 talked about the fundamental role of parents during childhood.

P6 said: "*Supervisor is in the workplace. But, the home is the base, parent is the most important*", which emphasizes the fundamental role of the home regardless the role of a team leader or work. "*The main responsibility is on the parent. When a child was grown on a specific style, will know that this negative behavior may affect the environment and society*", P7 confirmed the role of parents and family as well.

In addition to childhood, P2, P3, and P7 all stated that education, either formal education such as university or high school or the informal education such as through reading and watching movies, could all enrich individuals with the correct concepts related to the environment. For example, P3 said: "*Most of my beliefs were inspired from my studying in university and my reading*". P7, advocating the role of educating in updating her knowledge, and in turn, her behavior, said: "*I had a thought that plastic bottle was the first and the cheapest choice, this when I was 10. Now, I'm 30, after passing all these years, I got the idea that plastic has a detrimental effect on environment. So, I reuse the plastic bottles*". Moreover, P2 stated that since religion is the main

guideline for human behavior in this community, it follows that education should include religious instruction which encourages individuals to be grateful for natural resources.

Along with education, many participants confirmed the importance of spreading knowledge amongst members of society to raise their awareness of new trends related to the environment, including P2, P4, P5, P7, P8, and P9. For example, P2 said: "*I feel it is my responsibility to tell my family members and my friends how to save the environment during their daily lives*". Advocating the perspective of directing others, P8 said: "*If I receive any beneficial post on internet related to a specific environmental issue, I forward it to the person who is behaving wrong in that issue*".

In addition, many participants mentioned that everyone has the responsibility to behave in a proper way in society, including P1, P2, P3, P4, P5, P6, P8, and P9. For example, P3 emphasized that; "*As long as everyone saves the natural resources, the quality of our lives will be enhanced, like, the quality of water. And there will be availability of resources for next generations*". P6, confirmed an individual's responsibility to correct the negative behavior of others and said: "*There is a Chinese saying: if somebody does not do it, I will do it. If somebody said it is impossible, I will definitely do it. So, this is my mode of life*". P8 gave an example of her personal behavior once she felt it was her turn to take an action and said: "*I extremely dislike seeing anyone throw cans from car's window during driving. So, I have a plastic bag in my car, like to collect all garbage. Personally, I do not like this bad action from people*".

"*Especially recently, with the massive changes in manufacture, human is on the earth from the beginning, but the transformation in industry that is happening now has a big negative effect on environments*", P4 explained why the level of the renewal process for natural resources is less than the level of our consumption. This is to confirm the responsibility of every person towards the environment.

"*We are interconnecting with the environment, the environment always will be there, but the difference is how human is connecting to the environment. It is the human itself, who make the environment good. If the human is bad, the environment will be bad, If the human is good, knows how to protect this environment, it will be good*", P6 explained how the lifestyle of the new generation affects the environment.

In conclusion, ones beliefs regarding the environment and the approach to educate others regarding the effects to the environment are consistent with ones personal beliefs. Participants mentioned these beliefs 21 times to illustrate in detail the personal belief branch of IGV.

4.4.2 Personal norms

This main theme contains three codes, which are (I) IGV- Personal obligations, (II) IGV- Moral preferences, and (III) IGV- Towards others.

For (I) IGV- Personal obligations, which refers to environmental behavior as mandatory tasks and reflects ones personal interests towards environmental issues. This code contains one sub code, which is conserving.

Participants mentioned some conservation behaviors that they have adopted, such as an obligation to save natural resources, i.e., paper, electricity and plastic.

In particular, P1, P3, P4, P5, and P9 stated that they collect used paper at home from family members and friends to reuse, repurpose and recycle. For example, P4 said: "*Usually, I use the papers to make models, also, I use the backside of empty papers. I do not throw them*". Advocating this opinion, P5 said: "*Reusing the papers becomes a habit. I apply it in home and in work*".

While P3 stated she tried to reduce the consumption of electricity at home by using the kitchen appliances, lights and A/C thoughtfully. For example, P3 said: "*Myself and my family reduced electricity consumption, turned off lights, kitchen appliances and A/C when we go out of room*". Advocating this, P1 and P9 agreed that both of them tried to reduce using plastic as much as possible, including bottles, gloves and tissue. For example, P1 said: "*I usually use cloth bags instead of plastic bags. Also, I use big glass bottle instead of plastic bottle*".

For (II) IGV- Moral preferences, refers to some voluntary environmental behaviors that reflect ones personal interests to environmental issues. This code contains one sub code, which is avoiding harm.

Participants stated some behavior they adopt personally to avoid harming the environment which including collecting trash and using natural alternatives. For collecting trash, P2, P3, P7 and P8 all confirmed that they did their best to collect and to separate waste at home, which will in turn make it easier for

disposal companies to get the full benefit of the waste. Moreover, they collected their personal trash when they went outside, such as at the sea or on a picnic. For example, P8 said: "*When we were in an outside place, we removed all trashes. We moved away and left our place as no one was there. It becomes a habit in our family. We feel that these places are for all persons and should be green always*". In addition, P2 mentioned that she usually uses natural herb instead of chemical cosmetics for her skin routine in order to avoid damaging the environment with chemical cosmetics.

For (III) IGV- Towards others, refers to action taken as a response towards the environmental behavior of others. This code contains one sub-code: taking initiative.

P2 and P8 revealed that they complained to authorities when witnessing someone throwing garbage out of their car window.

In conclusion, participants confirmed that the personal norms component of IGV comprises of mandatory actions toward self, voluntary actions toward self, and actions toward others regarding the environment. This branch of IGV (norm) formulates the standard behaviors of persons toward the environment. Participants mentioned these norms 14 times to illustrate these actions in detail.

4.4.3 Mechanisms of G-TFL on IGV

This main theme contains two codes, which are (I) G-TFL-IGV- Beliefs and (II) G-TFL-IGV- Norms.

For (I) G-TFL-IGV- Beliefs refers to the effect of leadership in instilling green beliefs into employees. This code contains two sub-codes, namely advertisement campaigns- influencing others and communication- harming the environment.

For the sub-code: advertisement campaigns- influencing others, P1, P3, P4, and P8 mentioned the role of advertisement by leaders or management generally in an organization influenced staff by raising their awareness and knowledge regarding the environment. For example, P3 said: "*Nice and attractive brochures and posters on the walls convince staffs to what she/he has to do in and out organization*". Supporting P3 in the role of advertising, P1 said: "*Advertisements have an impact on individuals by increasing their awareness. It is a source to get all updates*".

For the sub-code: communication- harming the environment, P2, P3, P4, P5, and P6 confirmed the importance of the continuous communication between leaders and followers to share environmental knowledge. These participants asserted the importance of talking with rational arguments to convince followers of the current status of the environment in order to convey information to them. For example, P2 said: "*If the supervisor is interested in issues related to the environment, they will update themselves, then, tell us about the current status and new techniques. So, our minds will be changed*". In line with P2, to emphasize the importance of communication to inform of updates, P3 said: "*When the supervisor sits with staffs to discuss new issues, he/she opens new channels to exchange ideas, so, to engage others to listen to such debates to update their knowledge*". Advocating this, P4 said: "*Talking daily to staff, like, this behavior you have to pay attention for it, it*

disturbs the system. Such comment drives staff's mind how his/her behavior may harm the environment".

For (II) G-TFL-IGV- Norms, refers to the effort of leadership to instill green standard practices into employee behavior. This code contains six sub-codes. These are habit formation- conserving, habit formation- avoiding harm, rules-conserving, rules- avoiding harm, role-model- avoiding harm, and communication- taking initiative.

For the sub-code: habit formation- conserving, P7 and P9 emphasized that a leader can encourage the practice of preserving natural resources and make it a habit since this behavior is achievable everywhere. For example, P9 stated that organizing daily routine to dispose of plastic creates a habit in the surroundings which in turn repeats the same behavior continuously. She said: "*My supervisor has two small bins in front of her office to collect plastics waste. I see some staff bringing plastic items from their homes to put inside the bins. In this way, she creates a habit among all staffs in conserving the environment*".

For the sub-code: habit formation- avoiding harm, participants revealed that when a leader repeated the same behavior to avoid harming the environment, it unconsciously drives employees to avert pollutants. P5 said: "*Our using of antibiotic becomes less, even if we got it in a description from hospital. We know from work that if it is not necessary to use it, we do not use it. Because it kills the beneficial microorganisms that benefit our bodies. This is exactly as we do in lab with other organisms, we decrease using antibiotic for them. What else, in work, our computers are adjusted to print on both sides. I do the*

same at home". P5 added that: "*We wash our hands before and after entering the lab. Our leader always asks new staff when someone enters the lab, did you wash your hand?*"

For the sub-code: rules- conserving, P1, P5, and P7 asserted that the setting of rules and regulations was important to strengthen green values of employees within the workplace. For example, P7 said: "*The leader usually announces a list of rules regarding the quantity and procedure of using raw materials in lab. In case a staff did not follow, the leader gives a verbal warning in the beginning, then, a written one*".

"*Rule for how many papers every staff can use per day and rule to apply printing on both sides may enhance the behavior of individuals. Maybe, they resist this change at the beginning, then, they have to follow it. Recently, my organization demands staff to get the permission to use certain chemicals and restrict the quantity*", P5 talked regarding the importance of rules.

For the sub-code: rules- avoiding harm, participants emphasized the importance of rules to prevent disturbing the ecosystem with some behavior, including maintenance of devices and waste management. For example, P8 said: "*The leader can change the action of staff. For example, if the leader sees a staff does not follow the waste disposal rules, throwing a tissue on the floor and damping chemicals together directly in the drain, in this case, usually the leader takes actions. Many actions have been taken before and notices were circulated again*".

For the sub-code: role-model- avoiding harm, P3, P4, P5, P7, and P9 asserted the positive impact, which exists as a result of a supervisor being a positive role model for staff. As staff look up to supervisors and they influence their attitude. P3 said: "*Once the followers see their managers properly disposing of chemicals, they mimic the same behavior*". Advocating P3's perspective, P5 said: "*If we find that our manager does not care, we also do not care at all. Maybe worse than him*". P4, mentioning an example, said the following: "*Because our manager puts waste containers for all kinds of waste and uses them strictly, all of us do the same. Previously, we mixed all waste together*".

For the sub-code: communication- taking initiative, P7 and P8 suggested that the continuous discussion between leader and follower motivates staff to become more responsible towards the environment. For example, P7 said: "*Leader has a role in encouraging staff to take a positive action in preserving environment at workplace*". Supporting the communication role of leader, P9 said: "*My supervisor communicated with us to ask students to bring their domestic plastic from their house and sending to recycling companies collectively*".

Finally, participants confirmed the importance of leadership to instill green values to staff. Thus, participants mentioned some strategies that are adopted by their leaders to instill green values (beliefs and norms) to staff. These strategies have been repeated 28 times.

In conclusion, after analyzing the data, IGV contains three themes to promote EGB amongst laboratories' staff with a total of seven codes and 13 sub-codes. Two of these sub-codes fell into a beliefs theme and three fell into a norms

theme. These beliefs and norms represent the participants' perspective regarding the IGV in laboratories. The final eight of these sub-codes represent the participants' perspective regarding the mechanisms the leader can use to instill these values (beliefs and norms) into laboratories' staff.

Table 4.4 demonstrates all themes, codes, and sub-codes of IGV with their definitions. Fig. 4.5 shows the combination of all themes with their codes and sub-codes in a hierarchical diagram. Fig. 4.6 illustrates which participants mentioned every sub-code. Appendix H shows the diagram of every theme of IGV separately.

Table 4.4: Themes, codes, sub-codes of IGV with their definitions

Theme	Definition	Code	Definition	Sub-code
Personal beliefs	Thoughts related to the environ-ment	IGV-About environ-ment	Personal thoughts regarding the current status of the environment	IGV- Beliefs-Harming the environment
		IGV-About self	Personal thoughts regarding how individuals impact the environment	IGV- Beliefs-Influencing others
Personal norms	Habitual practices followed by individuals as a standard toward self and others to save the environ-ment	IGV-Personal obligation s	Taking responsibility toward the environment	IGV- Norms-Conserving
		IGV-Moral prefer-ences	Moral choices to save the environment	IGV-Norms-Avoiding harm
		IGV-Towards others	Changing the surroundings	IGV- Norms- Taking initiative
Mecha-nisms of G-TFL on IGV	Mecha-nisms for leaders to influence personal values	G-TFL-IGV-Beliefs	Ways for leaders to instill environmental beliefs into staff behavior	Advertisement campaigns-Influencing others
				Communication-Harming the environment
		G-TFL-IGV-Norms	Ways for leaders to instill environmental norms into staff behavior	Habit formation-Conserving
				Habit formation-Avoiding harm
				Rules- Conserving
				Rules- Avoiding harm
				Role-model- Avoiding harm
				Communication-Taking initiative

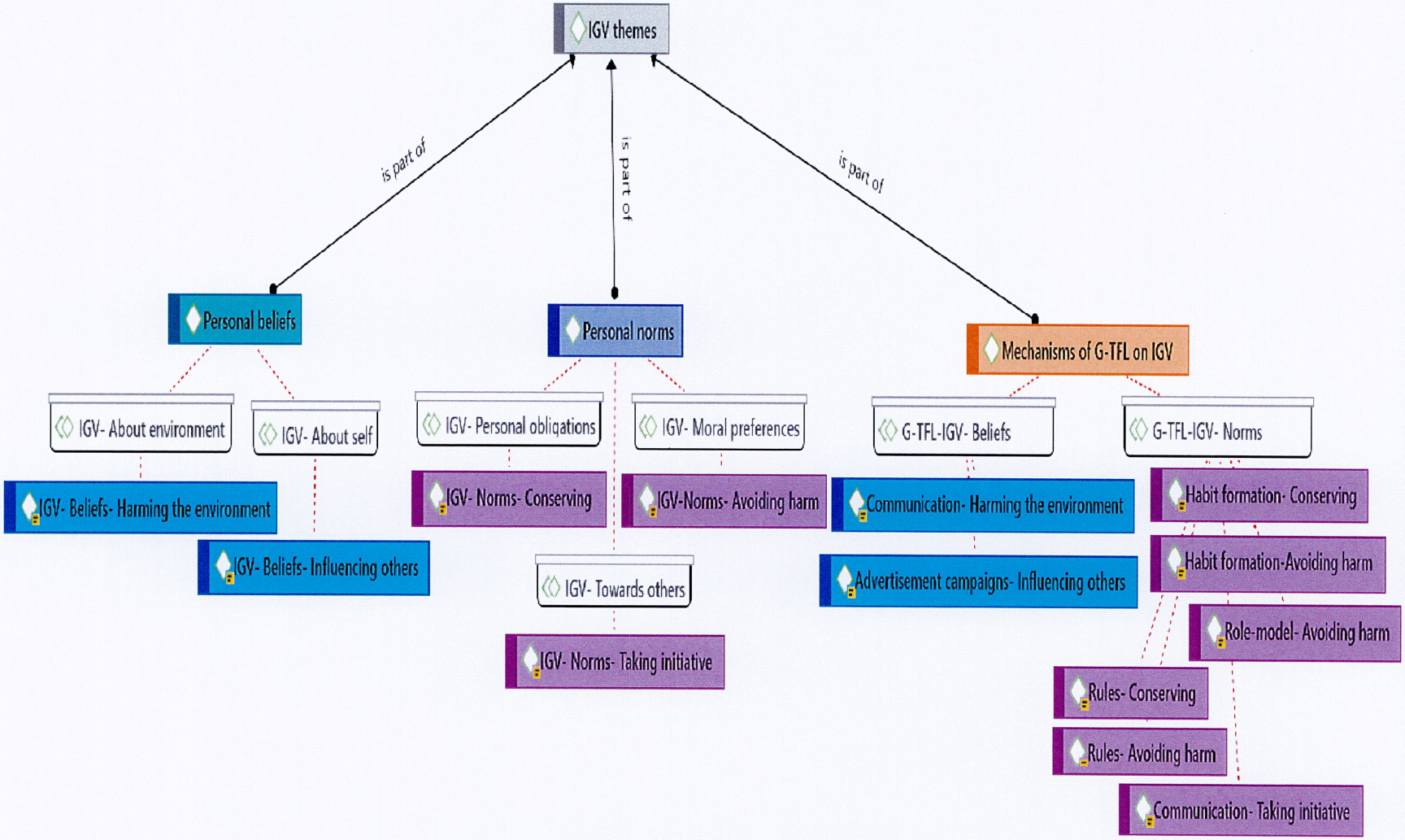


Fig. 4.5: Combination of all themes of IGV

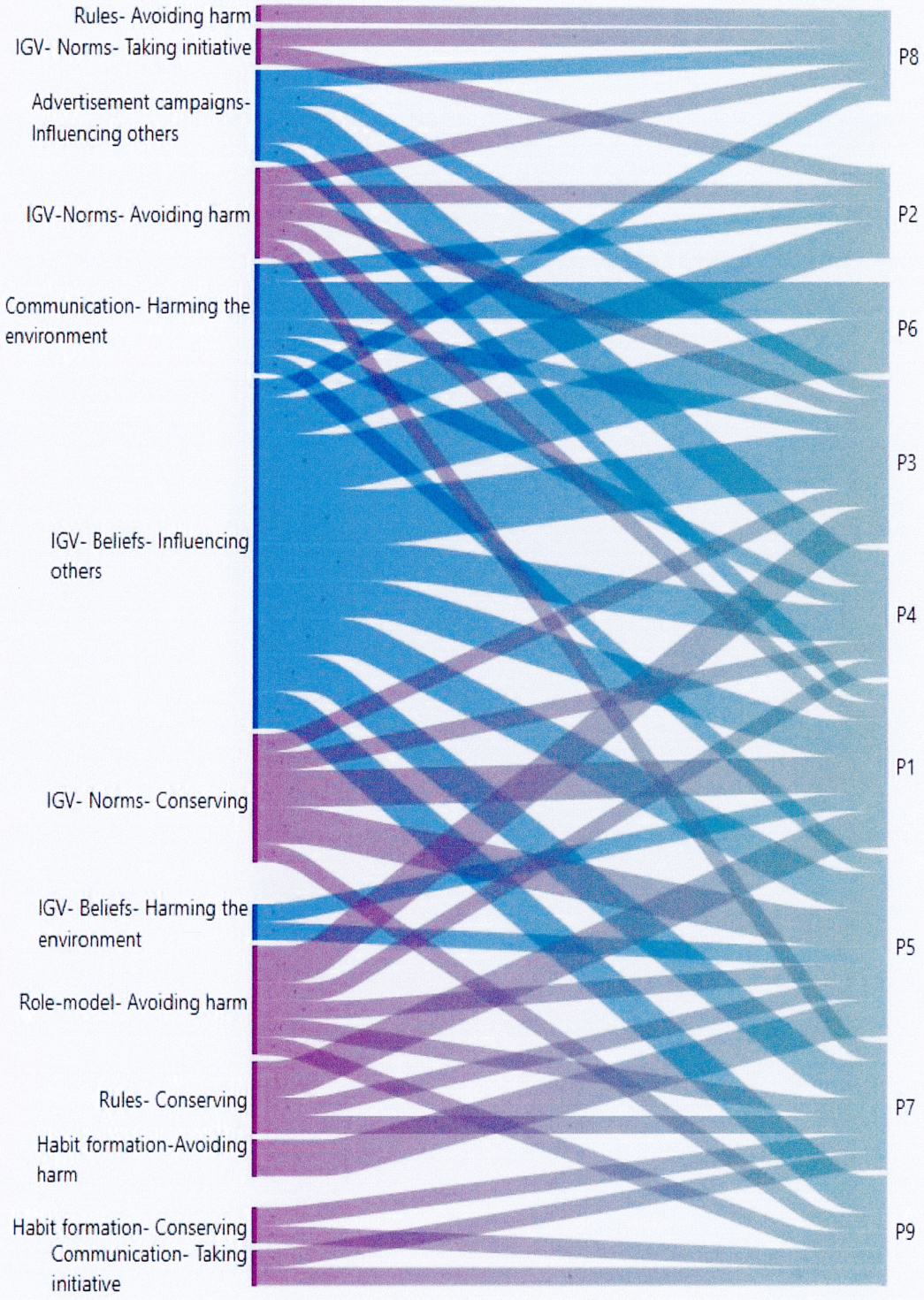


Fig. 4.6: The frequency counts (repetition) of IGV sub-codes amongst participants in a Sankey diagram

4.5 Whole Framework

After analyzing every component of this study in the previous sections, this section illustrates all components in a full diagram as a whole framework. As shown in Fig. 4.7, G-TFL comprises of six themes, namely, (I) visioning, (II) encouraging, (III) group goal, (IV) high performance expectation, (V) individual support, and (VI) intellectual stimulation, while EGB comprises of five themes, which are: (I) transforming, (II) conserving, (III) avoiding harm, (IV) influencing others, and (V) taking initiative. IGV comprises of three themes, which are (I) personal beliefs, (II) personal norms, and (III) mechanisms of G-TFL on IGV. As mentioned on the arrows, these themes are parts of the main component. The findings indicated that EGB can be achieved by either the G-TFL or IGV approach. In particular, the findings showed that G-TFL is a cause of IGV and subsequently, IGV leads to EGB.

The association amongst all the component has been analysed using Code Co-occurrence analysis and shown in a Sankey diagram (Fig. 4.8) as well as in Table 4.5. It is obvious that the association between G-TFL and EGB is stronger than the association between G-TFL and IGV. The association between G-TFL and EGB repeated 57 times, while the association between G-TFL and IGV repeated 21 times. Thus, the first approach to achieve EGB via G-TFL is more prominent when compared to IGV.

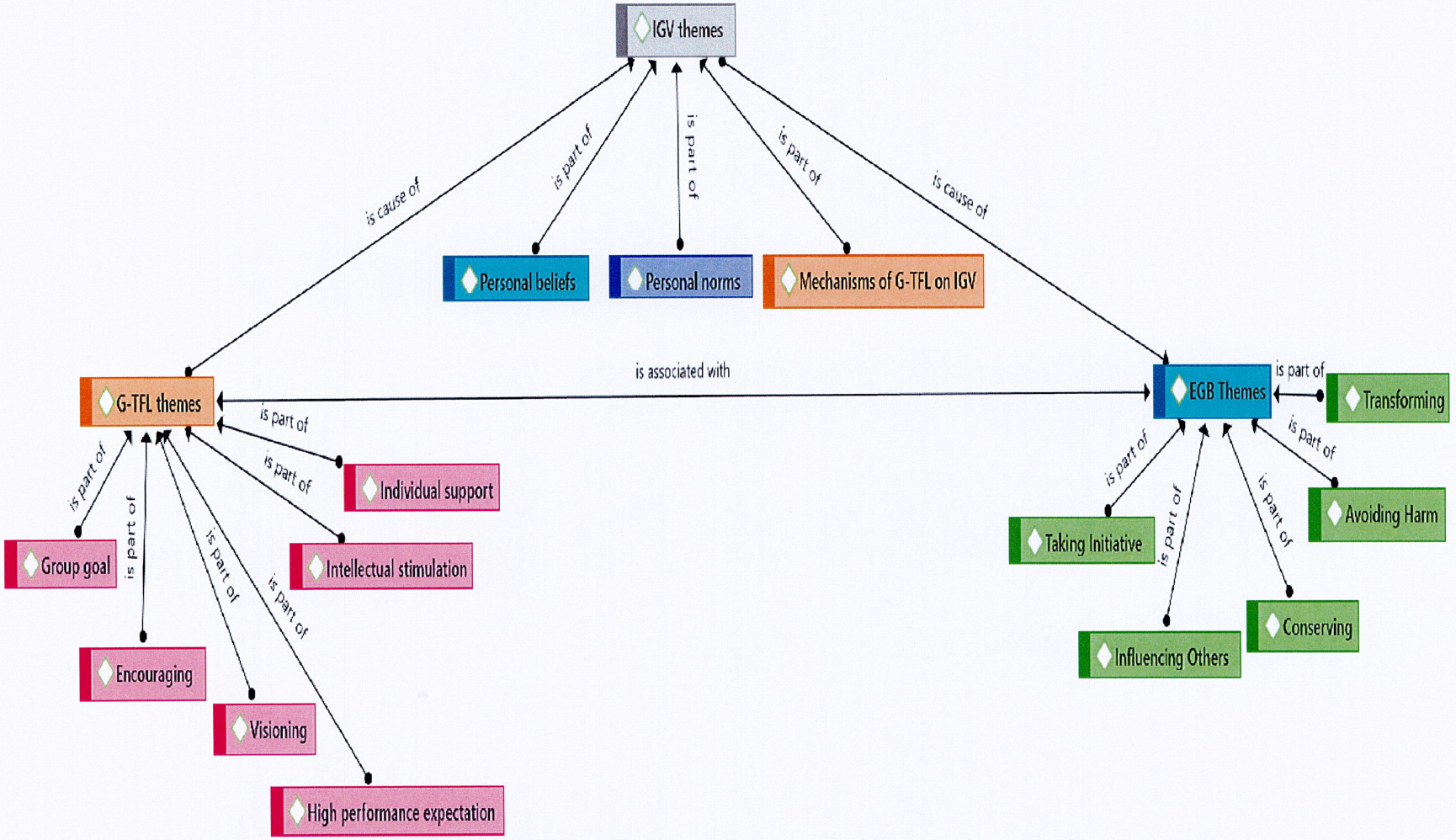


Fig. 4.7: The full framework combining all components of this study; G-TFL, IGV, and EGB

Table 4.5: The association amongst all components; EGB, G-TFL, and IGV

		EGB	IGV
		104	40
G-TFL	56	57	21
IGV	40	41	

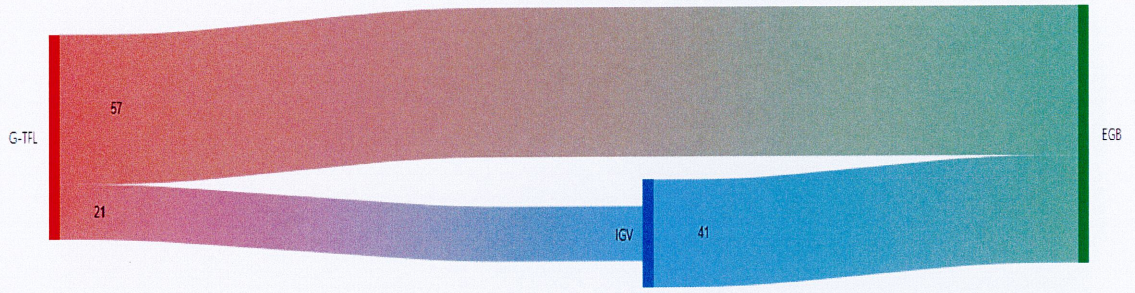


Fig. 4.8: The association amongst all components; EGB, G-TFL, and IGV in a Sankey diagram

4.6 Summary

Upon these indicated findings, the following assessment has been made:

All respondents are female. The majority of them hold a Bachelor's degree (5/9) and worked as a technician (7/9). On average, they work twenty hours per week.

The finding of EGB revealed that conserving behavior represents the most adopted green behavior amongst laboratories' staff, followed by avoiding harmful behavior. The consensus on these two behaviors is due to the nature of work in a laboratory, including the preservation of natural resources for the former behavior and proper waste disposal for the latter behavior.

The finding revealed that the visionary factor of a leader represents the most impactful leadership factor on laboratories' staff to motivate their green behavior, followed by encouragement and lastly, intellectual stimulation.

The finding of this study also revealed that the most impactful mechanisms for leaders to embed green values into laboratories' staff is to be a positive role model and regular communication on the topic with subordinates.

The finding of the whole framework confirmed that the direct role of G-TFL to drive EGB is greater than the influencing role of IGV to drive EGB. This is due to the fact that instilling green values in any individual before they become adults and commence work is out of the leader's control.

Chapter 5 Discussion, Limitations and Recommendations

5.0 Introduction

This chapter exhibits the discussion of the findings presented in Chapter 4. It also provides the theoretical and practical implications for literature and policy makers respectively, followed by the study's limitations and recommendations for future research. Finally, the chapter concludes with this study's conclusion.

5.1 Discussion

This section of this chapter discusses all the themes in Chapter 4. Firstly, it discusses the themes of green behavior amongst laboratories' staff. Secondly, it discusses the impact of G-TFL on EGB. Finally, the discussion focuses on the mechanisms of how G-TFL influences IGV amongst laboratories' staff to exhibit EGB.

5.1.1 EGB amongst Laboratories' Staff

EGB is defined as "Scalable actions and behaviours that employees engage in that are linked with and contribute to or detract from environmental sustainability" (Ones and Dilchert, 2012, p. 87). This model of EGB comprises of five meta-categories with 16 categories. Based on the initial work of Ones and Dilchert (2012), Ones et al. (2018) added an additional category- managing, facilitating and coordinating. In sum, the EGB has 17 categories. This model is called the Green Five. These five meta-categories of EGB are: *(I) transforming, (II) conserving, (III) avoiding harm, (IV) influencing others and (V) taking initiative.*

This definition and the categories of EGB were developed in other workplaces. Accordingly, the first question of this study was to explore green behavior exclusively in laboratories from the perspective of laboratories' staff. Based on the findings in Chapter 4, all five meta-categories exist in laboratories. The codes and sub-codes are discussed below and list the themes in descending order as per repetition:

I. "*Conserving*" refers to "Avoiding wastefulness and thus preserving resources" (Ones et al., 2018, p. 20). Since the nature of work in laboratories involves the consumption of massive resources such as water, reagents, chemicals, electricity, raw materials, natural resources, gas and supplies, the conserving of said resources represents the most important behavior amongst laboratories' staff. Accordingly, laboratories' staff mentioned four approaches to achieve conservation behavior. Approach (1) "*EGB-Reducing use*" was mentioned 22 times. The majority of participants stated that they tried to minimize using natural resources in the laboratory as much as possible, especially the resources that have a high negative impact on the environment, e.g. plastic, electricity and chemicals. Carrico and Riemer (2011) noted that employees may not take the initiative to reduce electricity if the organization did not provide any incentive to decrease an electricity bill. However, the findings in this study indicated that laboratory staff exhibit a behavior of conservation by reducing the use of electricity at work. Approach (2) "*EGB-Reusing*". Laboratories' staff demonstrated that they reuse materials. They do not dispose the excess materials such as paper, plastic and prepared solutions. Approach (3) "*EGB- Recycling*" was mentioned three times during the interviews. The recycled items in laboratories included chemicals, glass and paper. Participants stated that adapting the original items into new products helps to conserve the original resource. However, this converting process requires energy such as an

increased consumption of electricity. Therefore, recycling was not the priority amongst laboratories' staff. In contrast, it was reported that hotel staff in Taiwan exhibited conserving behavior by giving away recycled materials to charitable organization (Chou, 2014). Approach (4) "*EGB- Repurpose*" was mentioned only one time during the interviews. Specifically, laboratory staff revealed that they focused on repurposing chemicals since the by-product of chemical reactions can be repurposed for a different laboratory protocol.

II. "*Avoiding harm*" refers to "Avoidance and inhibition of negative environmental behaviour, reducing impact, and mitigating/restoring environmental damage" (Ones et al., 2018, p. 21). Since the nature of work in laboratories produces a considerable amount of waste, disposal of this said waste represents a big challenge in a laboratory workplace. In interviews, laboratories' staff explained two approaches to avoid harming the environment. Approach (1) "*EGB- Pollution*", the majority of laboratories' staff mentioned that they dump waste into specific containers. For example, specific containers were utilized for chemical waste (acid, alkali, organic and flammable liquid waste), as was the disposal of broken glass, where specific containers were used. Approach (2) "*EGB- Strengthening ecosystem*" has also been applied whereby the repairing and recovering of damaged devices in the laboratory occurred frequently.

III. "*Transforming*" refers to "Adapting and changing to make work products and processes more sustainable" (Ones et al., 2018, p. 19). Laboratory staff stated the importance of changing their work surroundings to be more consistent to environmental standards. Transforming is accomplished via four approaches. Approach (1) "*EGB- Alternatives*". The majority of laboratories' staff mentioned that they exchanged currently used detrimental

materials in some experiment–with more–appropriate alternatives. An example of said materials is: Formalin, Mercury, Plastic and Silver nitrate. Approach (2) "*EGB- Implementing*" has been mentioned six times by participants during the interviews. Some revealed that they requested of their organization to purchase efficient devices to reduce electricity consumption. Approach (3) "*EGB- Optimizing*". Participants also asserted that the procedures of some laboratory protocols have been changed to minimize the negative impact on the environment. For example, demonstrations are given before groups rather than individuals in order to minimize the use of resources such as chemicals and other items. For example, P5 said: "*We found that in some cases, only a small trace of chemical was necessary*". Approach (4) "*EGB- Eco-innovation*" has been mentioned only two times by laboratories' staff. Participants mentioned that they were working on two sustainable projects related to converting waste to energy and cleaning ocean water as these projects were an eco-innovation for a better environment.

IV. "*Influencing others*" focuses on "Spreading sustainability behaviours to other individuals" (Ones et al., 2018, p. 22). Due to the rapid developmental updates related to the environment, participants emphasized the importance of sharing this information with each other. The approach of "*EGB-Educating and training*" has been mentioned 15 times by laboratories' staff. They confirmed the importance of conducting conferences, seminars, workshops, and the like in order to further the education of both staff and students. They are of the opinion that activities could keep them updated with the latest knowledge and practices, which in turn support their endeavors to achieve their sustainable goals. For example, P7 said: "*We held conferences related to sustainable energy and climate change to share the environmental knowledge among all staff*". Moreover, P9 said: "*We presented our work in international conferences and organized workshops*

for staff and students in secondary schools also. We engaged students in projects to teach them how to use renewable energy". Supporting this, Pless, Maak, and Waldman (2012) who asserted that training programs were important to equip trainees with the necessary skills and knowledge to adopt green behavior. For instance, some hotels in Taiwan organized environmental events to educate their community on green behavior (Chou, 2014).

v. "*Taking initiative*" refers to "Behaviors that are Proactive, entrepreneurial, and involve a certain level of personal risk or sacrifice" (Ones et al., 2018, p. 22). Laboratories' staff is taking the initiative to promote green behavior at their workplace, such as adding more waste containers to collect plastic waste. Concurring with this, Chou (2014) urged organizations to provide more funds to implement practical ideas that could aid in conserving the environment.

The above discussion described EGB amongst laboratories' staff in the Kingdom of Bahrain. The findings were consistent with numerous studies that have investigated EGB in other contexts such as in China, the United Kingdom, and Australia (Cuifang and Rui, 2019; Manika et al., 2015; Norton et al., 2017).

5.1.2 The Impact of G-TFL on EGB amongst Laboratories' Staff

G-TFL is defined as "Behaviours of leaders who motivate followers to achieve environmental goals and inspire followers to perform beyond expected levels of environmental performance" (Chen and Chang, 2013, p. 109). This model of G-TFL of Chen and Chang (2013) was built on the model of TFL (Podsakoff et al., 1996) to incorporate the dimensions of TFL into the green behavior of leaders. Accordingly, G-TFL comprises of six dimensions, which are: (I) *visioning*, (II)

encouraging, (III) *group goal*, (IV) *high performance expectation*, (V) *individual support*, and (VI) *intellectual stimulation.*

In this study, the second question was to explore how a G-TFL leader affects the green behavior amongst staff in laboratories. Based on the findings in Chapter 4, all the dimensions of G-TFL occur in laboratories and are considered as themes in this study. The themes and their codes are illustrated in descending order as per the amount of repetition as per the following:

I. "*Visioning*" refers to "Inspiring the followers with the vision of the future" (Morkevičiūtė, Endriulaitienė, and Jočienė, 2019, p. 314). Moreover, it is "The expression of an idealized picture of the future based around organizational values" (Rafferty and Griffin, 2004, p. 332). Since enhancing the status quo of organizations to be more sustainable requires articulating a vision by a leader, achieving this vision is a factor that affects the green behavior of laboratories' staff. The findings showed that laboratories' staff identified three approaches to achieve this visioning factor. Approach (1) "*G-TFL- Seeking information*". The majority of participants mentioned that the leader acts as an active learner to understand the perception of staff. Approach (2) "*G-TFL- Seeking opportunities*". Seven participants emphasized the importance of finding out solutions for current issues by a leader, as it is his/her responsibility to tackle any problem they encounter regularly. For example, leaders are always searching for alternatives to detrimental items such as plastic and substituting chemicals for safer alternatives where possible. Approach (3) "*G-TFL- Launching initiatives*". Laboratories' staff highlighted the substantial impact of launching new innovative projects by leaders, including controlling of plastic disposal and improving waste management. This influential and visionary role was advocated by Afsar et al. (2020). Afsar et al. (2020) confirmed that a shared

'green' vision was crucial to enhance employees' pro-environmental behavior in the services and manufacturing sectors in Pakistan. Moreover, Sugiarto, Suharti, and Dwiatmadja (2019) emphasized that incorporating green principles into the company's vision, mission, and values by leaders had a positive impact on employees' green behavior. In sum, articulating a vision by leaders that illustrates the ideal goals and a clear strategy for the organization and for all employees will motivate them to take action that aligns with the vision.

II. "*Encouraging*" refers to inspirational communication "The expression of positive and encouraging messages about the organization, and statements that build motivation and confidence" (Rafferty and Griffin, 2004, p. 332). The participants in this study shed light on the role of leaders in supporting staff to achieve the sustainable goals of organizations. In interviews, laboratories' staff explained two approaches that encouraged them to adopt green behavior at work. Approach (1) "*G-TFL- Advising*" has been mentioned eight times to drive the attention to the impactful role of directing staff to the right behavior. P7 explained: "*There should be clear instructions for technicians or anyone that has access to labs, written everywhere*". Moreover, P5, emphasized the impact of seeing her supervisor as an example to follow, said: "*If he says do not follow this procedure, he should firstly become the model of this procedure*". This is because providing an appropriate model is "Setting an example to the followers that is consistent with the values of the leader" (Morkevičiūtė et al., 2019, p. 314). Advocating the role-model perspective, Wu et al. (2021) stated that the voluntary workplace green behavior of supervisor leads to a trickle-down effect, which in turn, leads to employee pro-environmental behavior. The data analysis of subordinate-supervisor dyads in the study of Wu et al. (2021) suggested that the positive trickle-down effect increased employee green self-identity.

Eventually, leading to more employees adopting green behavior. The interviews also revealed "*G-TFL- Motivation*" as another approach. That is, the majority of laboratories' staff confirmed that the positive influence of motivation by their leaders has an impact on their green behavior. For instance, giving the responsibility to source the best disposal vendors, awarding a certificate for achievement, an incentive per month for the employee who exceeds the requirements, announcing outstanding accomplishment in meetings and acknowledging staff with prominent achievement in front of all other staff. In line with this finding, Graves and Sarkis (2018) and Graves et al. (2019) reported that employees who showed a higher green behavior were fuelled with internal motivation.

III. "*Intellectual stimulation*" indicates "Helping the followers to become more creative and innovative" (Morkevičiūtė et al., 2019, p. 314). It also includes "Enhancing employees' interest in, and awareness of problems, and increasing their ability to think about problems in new ways" (Rafferty and Griffin, 2004, p. 333). Since the status quo of behavior in laboratories that is related to the environment requires lots of modification, stimulating laboratories' staff to reconsider the current situation in an innovative way is a factor that affects the green behavior of laboratories' staff. Accordingly, in interviews, the participants mentioned the approach "*G-TFL- Thinking green*" 14 times to emphasize the fundamental role of encouraging laboratories' staff to use their minds to find innovative solutions. In the interviews, participants illustrated that arranging workshops, seminars, conferences and training by leaders updated their knowledge related to advanced tools that could be used to conserve the environment in a better way. For example, P4 said: "*Workshops will increase our awareness which will cause a positive impact on our behavior*". Practically, Lee, Sung, Wu, Ho, and Chiou (2020) engaged the sample of their study to experiment with

climate change risks to stimulate them to rethink behavior that related to the environment. The study indicated that respondents exhibited behavior related to saving energy by using air-conditioning sparingly, cleaning benches and choosing options that are compatible with the safe keeping of the environment. Similarly, Donmez-Turan and Kiliclar (2021) found that students who had environmental training displayed two times more green behavior than those who had not been trained. Accordingly, these studies provide practical evidence for leaders to motivate employees to source innovative approaches in order to tackle current environmental issues.

IV. "*High performance expectation*" refers to "Encouraging the followers to enhance performance and quality of the outcome" (Morkevičiūtė et al., 2019, p. 314). This means that leaders have high expectations with regards to environmentally conscious behavior from employees. During the interviews, participants revealed that their leaders performed continuous evaluation of their staff's environmental behavior. Continuous appraisal of staff behavior by leaders is necessary to determine if staff is adhering to the expected behavior protocol. P7 said: "*In the workplace, if the staff was careless and do not follow the rules, the leader has to give him a verbal warning or a written warning depending on the mistake*". The high standard of expectation was also exemplified in daily workflows process. Participants revealed that their leaders were reviewing the protocols in laboratories periodically to assess their impact on the environment. The study of Martín-Jaime, Velasco-Martínez, and Tójar-Hurtado (2021) has evidenced the importance of continuous assessment on green behavioral outcomes. In their study, evaluation of multiple environmental education programs amongst primary school students in Spain revealed that one program was more positive in enhancing a proper behavior with the domestic drain. Moreover, Dino, Leeuw, Sariyildiz, and Stouffs (2014) stated that the continuous assessment

of energy consumption in real estate was important to improve optimal energy performance since the current trend is to use renewable energy. Thus, a continuous evaluation process is a driver to produce the best performance behavior to protect the environment.

V. "*Individual support*" means "Paying attention to the followers' individual needs for achievement and growth" (Morkevičiūtė et al., 2019, p. 314). The behavior of every individual depends on his/her culture/education/family and so on, and thus, the prerequisite of everyone to adopt green behavior varies. Accordingly, four participants declared that supportive leadership for every staff member is a factor to improve a laboratory staff green behavior. Thus, one approach has been mentioned to achieve this individualized support, called "*G-TFL- Consideration*". During interviews, laboratories' staff explained how it is important to deal with every employee separately as every person is different. For example, P8 said: "*Not all staffs have a similar level of knowledge*". In other words, "Expressing concern for followers and taking account of their individual needs" (Rafferty and Griffin, 2004, p. 333) is essential to improve the green behavior amongst the employees in laboratories.

VI. "*Group goal*" means "Promoting cooperation among the employees so that they can work towards a unified goal" (Morkevičiūtė et al., 2019, p. 314). The importance of fostering the acceptance of group goals has been mentioned four times by participants. The approach of "*G-TFL- Working together*" reflects the values of no partiality or grouping amongst laboratories' staff and encouraging staff to work as a team. Supporting the positive role of coordination amongst staff, Vesely, Klöckner, and Brick (2020) stated that participants who engaged in pro-environmental behavior

preferred to have cooperative partners. This is because cooperative partners can become a source of motivation to each other to achieve the goal.

The above discussion described how G-TFL affects EGB amongst laboratory staff in the Kingdom of Bahrain. Generally, the result was consistent with numerous studies that have investigated the role of G-TFL in instilling environmental behavior in various contexts, such as G-TFL with green product development performance in Taiwan's electronics industry (Chen and Chang, 2013) and in the local government sector in China (Zhou et al., 2018). G-TFL with green performance in Taiwan's electronics industry (Chen et al., 2014). G-TFL with employees' green creativity in the information technology industry located in China (W. Li et al., 2020) and in hospitability industry in India (Mittal and Dhar, 2016).

Accordingly, managers in all these mentioned sectors indicated that when leaders are *encouraging, intellectually stimulating, visioning, expected high performance, willing to provide individual support,* and there is an *emphasis on group goals*, green behavior amongst employees will be fostered.

5.1.3 The Mechanisms relating G-TFL and EGB Laboratories' Staff

IGV is defined as "Green values are the result of sustainable development, which mainly refers to individual attitudes and behaviours in sustainable development" (Zhou et al., 2018, p. 5). This model of IGV of Zhou et al. (2018) was built based on the VBN Theory that originated by Stern et al. (1999) to support environmentalism which constitutes of (I) environmental beliefs, and (II) environmental norms.

The third question focused on the mechanism regarding how G-TFL can influence EGB of laboratories' staff, i.e., the interfering mechanism of IGV. The discussion will begin with the discussion of (I) personal beliefs, (II) personal norms, and then theme (III) which will discuss the mechanism of how G-TFL influencing EGB.

I. "*Personal beliefs*" refers to the thoughts of an individual regarding the environment in their daily activities (Zhou et al., 2018). In interviews, it was found that personal beliefs are related to two aspects. Aspect (1) "*IGV- About environment*", was found that participants have clear beliefs regarding the causes that harm the environment, such as the waste of industry, which pollutes the air and water due to the outbreak of COVID-19 pandemic. Aspect (2) "*IGV- About self*", participants believe that every individual should play a role in preserving the environment. Participants believed that leaders have the responsibility to lead others to save the environment. For example, parents that are serving as leaders in the family can instill environmental beliefs into a child during childhood. They stressed the importance of imparting green values during childhood, as children are able to absorb new beliefs quicker at a young age. P2 recalled the role of parents: "*I learned from my parents how to overestimate the grace of the environment. Now, I'm trying to instill all environmental values into my kids*". Supporting the role of education, P9 said: "*I join a center to teach kids how to protect the environment*". This is to emphasize the role of education for future generations. As for society in general, laboratory's staff acknowledged personal responsibility in raising awareness amongst adult people. For example, P7 said: "*We have to spread information that is approved by statistical proof because this is the way to convince those people who are affected by numbers and percentage*". In summary, participants stated that

their personal beliefs regarding the causes that harm the environment affect how they engage and influence others to protect the environment.

II. "*Personal norms*" means "Employees have intention to act on these environmental issues" (Zhou et al., 2018, p. 7). In interviews, laboratories' staff mentioned three aspects of norms. Aspect (1) "*IGV- Personal obligations*". Laboratories' staff expressed that actions such as reduce/reuse/repurpose/recycle should be followed. Participants stated that they possess the habit of reducing the consumption of electricity, paper and water. Aspect (2) "*IGV- Moral preferences*". Laboratories' staff stated that they are trying their best to avoid harm to the environment when alternatives are available. Aspect (3) "*IGV- Towards others*". Participants stated that they have initiatives to influence the wrong behavior of others, such as reporting to authorities if they witness someone doing something harmful to the environment. In addition, they also took the initiative to bring containers from home to collect plastic bottles from students. These daily initiatives become habits that are usually followed by participants towards society. To sum up the personal norms, participants stated that they have three habits they use to follow them: personal mandatory habits, personal voluntary habits and habits toward others.

III. "*Mechanisms of G-TFL on IGV*". Participants mentioned mechanisms to be adopted by their leaders to influence their mentioned beliefs in theme one and their mentioned norms in theme two. Thus, there are two approaches. Approach (1) "*G-TFL-IGV- Beliefs*" and Approach (2) "*G-TFL-IGV-Norms*".

Concerning approach (1) "*G-TFL-IGV- Beliefs*", the interviews showed that there were two mechanisms where the G-TFL could influence their beliefs:

(a) "*Advertisement campaigns- Influencing others*" and (b) "*Communication-Harming the environment*".

Regarding (a) "*Advertisement campaigns*". In interviews, five participants stated that advertising campaigns by management have a substantial bearing on them. This is because the advertising campaigns remind them that the major issues related to environment are caused by disastrous human behavior. Big posters/screens in halls, corridors with continuous alarming messages, inviting prominent activists to seminar to raise awareness and circulating a daily memo containing the environmental goals of the organizations are examples of campaigns leaders can adopt to influence the values of their employees. For example, P4 said: "*Continuous broadcasting and lecturing increase our awareness. Like, this issue is important to highlight on it, so we will pay attention for it. I think that more reminders and awareness are required to encourage us to stick to the proper environmental practices*". Consistent with this view, scholars McCormack, Martin, and Williams (2021) stated that environmental films convey relevant environmental knowledge to spectators, which ultimately impacts their environmental behavior. This persuasion occurs via three pathways; firstly, reducing resistance through the immersion in good stories, secondly, influencing directly with an audience identity by encouraging them to assess their own behavior when compared to the behavior portrayed. Thirdly, providing a meaningful experience that has cognitive and affective contents. Similarly, Xiao, Liu, and Ren (2022) analyzed data collected from the China General Social Survey in 2013 and found that internet technology can be used to provide environmental knowledge. For instance, pop-up videos and applications to record carbon footprint have a positive effect on an individual's pro-environmental behavior.

Regarding (b) "*Communication*". In interviews, six laboratories' staff stated that communication between the leader and the subordinate enlightens the mind of the subordinate. These open discussions between the two parties provide the opportunity to exchange knowledge, to obtain new information/statistics and to influence the others thinking or belief with evidence. For example, P6, advocating the role of positive communication, said: "*Accepting advice said in a nice communication is human nature*". P6, continued her perspective regarding the role of leader in the communication, said: "*The leader should consider the comfort zone of each person. If they are being lazy, this attitude should be disturbed, and the leader should help the staff member to logically understand*". To sum up, when the leader transferring logical proof to laboratories' staff regarding their detrimental beliefs toward the environment, leaders improve laboratories' staff minds regarding sources that harm the environment.

As for approach (2) "*G-TFL-IGV- Norms*", four mechanisms have been found to affect the habits of staff in laboratories: (a) "*Habit formation- Conserving/ Avoiding harm*", (b) "*Rules- Conserving/ Avoiding harm*", (c) "*Role-model- Avoiding harm*", and (d) "*Communication- Taking initiative*".

Regarding (a) "*Habit formation*": during the interviews, two participants stated that developing common practices into work protocol aiming to conserve natural resources is a manner by which a leader can drive laboratories' staff to follow the same norm of conserving raw material daily. For example, P5, gave an example of a protocol that has been applied to save paper, said: "*The Setting of staffs' computers is adjusted to print on both sides*". Moreover, two participants emphasized the substantial role of driving laboratories' staff by the leader to adopt common practices focused on averting harming the environment. The study of Liu, Ma, Qu, and Ryan

(2020) amongst travelers in the United States, highlighted the important role of habit in determining daily green behavior. Concurring with Liu et al. (2020), MacInnes, Grün, and Dolnicar (2022), found that habit is the key driver and the explanation for the occurrence of PEB amongst tourists in the United Kingdom, the United States, Australia, Canada and New Zealand. In the same vein of proposing the building of habit to encourage green behavior, Ghazali, Mutum, and Ariswibowo (2018) emphasized that "Green habit was a better predictor of green purchase behavior than green purchase intentions" (Ghazali et al., 2018, p. 650). In particular, Ghazali et al. (2018) urged marketers to promote green habits, especially amongst children when designing marketing campaigns. In sum, the findings from this study relating the role of habit and EGB concur with earlier studies in different contexts, which all stressed the importance of leaders insisting on green behavior by laboratory staff, which eventually led to green behavior becoming habit amongst staff.

Regarding (b) "*Rules*". In interviews, participants emphasized that clear regulations have a pivotal role in enhancing the green behavior of laboratories' staff on two aspects: conserving natural resources and avoiding harming the environment. These regulations include financial penalties/punishment for those who did not comply with the said terms and conditions. For example, P7 said: "*In workplace, if staff was careless regarding environmental rules, leader gives him verbal warning or written warning*". In other words, participants believe that clear rules regarding the disposal of waste and the handling of devices have a fundamental impact on the standard behavior of staff to avoid harming the environment. Thus, continuous assessing of staff environmental behavior assists an organization to achieve their environmental target. Scholars support the positive role of regulations to encourage green behavior of individuals and organizations. In

the effort to reduce the massive amount of discarded personal protective equipment during the outbreak of the COVID-19 pandemic, rules such as signage, specific personal protective equipment waste bins, stricter regulations and efficient enforcement were implemented (Thiel et al., 2021). Similarly, Malinovsky, Osina, and Trikoz (2020) advocate the importance of legal tools to promote green behavior. Accordingly, they proposed environmental and legal tools in the Russian Federation to legalize the procedure and criteria for assessing the environmental impact and security mechanisms in the biosafety sector. Likewise, Zhang et al, (2020) proposed the authorities in Xi'an city in China to enforce environmental regulations in their effort to promote urban green transformation. In sum, the findings in this study concur with previous studies which expressed the important role of leaders in enforcing rules and regulations that will consequently drive laboratories' staff to follow green practices in the workplace.

Regarding (c) "*Role-model*". In the interviews, six participants stated that importance of the presence of the leader as an example for the followers to look up for him/her and follow his/her behavior. To emphasize the positive influence of a leader as a role model, the study of employee-leader dyads from Chinese manufacturing sectors and from other different sectors in South Korea respectively revealed that leaders' voluntary workplace green behavior motivated their employees' green innovation in production and processing (Cai, Yang, Bossink, and Fu, 2020) and the voluntary workplace green behavior of subordinates (Kim, Kim, Han, Jackson, and Ployhart, 2017). These studies summarized that leaders whose behavior is oriented directly toward the environment are considered as a major antecedent for EGB. This reinforces the importance of leader behavior, as it is a role model for followers to conduct their duties in a similar manner. Eventually, being a role

model for a staff is a substantial mechanism to encourage them to adopt the right behavior with little resistance.

Regarding (d) "*Communication*". Participants stated that open discussion between the leader and staff motivates them to exhibit more environmental behavior. Supporting the role of communication, Güntner, Endrejat, and Kauffeld (2021) found that participants in guided group discussions focused on finding solutions together with their leaders, triggered a readiness to change behavior amongst their co-workers regarding energy consumption to minimize toxic emissions. In other words, communication signifies the active role of a leader's initiative on environmental practices which eventually drives laboratories' staff to form the norms of saving the environment.

The above discussion described the mechanisms of IGV and how it affects EGB amongst staff in the Kingdom of Bahrain. The details of this IGV intervention have been mentioned and described. Generally, the role of IGV has been investigated as a whole on behavior that aim to protect the environment in a wide range of contexts. For example, environmental norms were a more influential predictor on EGB than the environmental beliefs in the hospitability sector in Taiwan (Chou, 2014), IGV moderated the effect of psychological green climate on extra-role green behavior in manufacturing sector the in China, while it did not moderate the effect of GHRM and psychological green climate on in-role green behavior (Dumont et al., 2017). Moreover, IGV positively influenced the green psychological climate, which lead to GPDP in government sectors (Zhou et al., 2018). However, in this study, it is discovered that IGV could play an interfering role between G-TFL and EGB.

5.2 Research Implications

This subsection represents the added value of this study according to its results to the knowledge building of literature as well as to policy makers.

5.2.1 Theoretical Implications

Theoretically, this research contributes to the existing body of literature on green behavior amongst staff in academic laboratories.

Specifically, this study supports the categories of the Green Five taxonomy introduced by Ones and Dilchert (2012) using the sample of staff in academic laboratories.

This study also provides an initial hint on the importance of G-TFL on the formulation of green behavior amongst laboratory's staff. While Podsakoff et al. (1996) established the taxonomy of TFL and Chen and Chang (2013) then determined the applicable of G-TFL in a general context, this study provides an explanation on a more specific role of TFL, namely G-TFL that could promote green behavior.

While previous study by Zhou et al. (2018) investigated the role of IGV as a moderator in two relationships related to green variables, which are G-TFL with green psychological climate and with green products development performance, Zhou et al. (2018) suggested implementing IGV in different contexts and between various components as a mediator and a moderator. This study discovered that IGV can be instilled by G-TFL, which in turn drives EGB.

To sum up, this study describes the EGB amongst staff in academic laboratories, the impact of G-TFL on EGB as well as how the mechanism of G-TFL can affect EGB.

5.2.2 Practical Implications

The themes of green behaviors resulted from this study provide several practical insights.

First, this study described the green behavior amongst laboratories' staff. Understanding this behavior in details is important as to outline strategies to minimize the negative impact of laboratories' activities on the environment. Specifically, understanding the constitution of EGB amongst laboratories' staff provides insights for policy makers to eliminate unnecessary behaviors in laboratories as well as to formulate positive behavior in laboratories.

It is evidenced in this study that it is crucial for leaders to formulate a vision with the latest information in order to motivate staff green behavior. In addition, the findings of this study suggest that the evaluation of green behavior should be conducted periodically. This study shows that when leaders incorporate latest information into organization's vision and take effort to evaluate green behavior periodically, staffs are more motivated to display this form of desired behavior.

From the perspective of organizations, it is worth having an online platform to sell, buy and exchange surplus chemicals or spare parts locally in the Kingdom of Bahrain amongst laboratories. Such a platform will help reduce the dumping of excessive chemicals into the environment and simultaneously reap the monetary benefits. Supporting this, Barbosa, Mol, and de Vasconcelos Barros (2020) revealed that the chemical waste exchange policy that was applied in Brazilian institutions between 2011 to 2018 saved about $79,333, reused 1075

reagents internally and donated 4382 items externally. Moreover, approximately one-third of all unused laboratory resources is used again via exchange programs for surplus resources, saving approximately $250,000 a year (Dolgin, 2018).

5.3 Research Limitations

Some limitations occurred while conducting this study. The first limitation was collecting data through a virtual interview instead of a face-to-face interview. This was done due to the COVID-19 precautionary measures. Such online interviews cannot capture emotions and the nonverbal cues of respondents, as there is no eye contact. In particularly, some of the female respondents refused to switch on the video camera due to cultural constraints. Thus, during online interviews, the researcher cannot ensure the interviewees were focused throughout the duration of the interview.

The second limitation is the insufficient responses from some participants. Although participants were provided with the interview protocol before conducting the interviews, some respondents felt timid to illustrate their thoughts in details. This is not surprising and should not be taken negatively as conservative socio-cultural beliefs and practices are the major-noticed characteristics of women in Arabic cultures (Ucal and Günay, 2019). Taking note of these cultural norms, the researcher tried to encourage respondents to express their thoughts by including some Arabic terms while interviewing and also tried to be more approachable to remove the personal barriers.

It is also worth to note that all interviewees in this study were female. Some studies (e.g. Kim et al. (2019) and Weerarathna et al. (2017)) indicate that females tend to exhibit greater EGB than males. Hence, the findings of this study should be interpreted with caution.

5.4 Recommendations for Future Research

Based on the nature of the current study, several recommendations are made for future researchers. First, it is recommended to conduct future studies related to EGB on various laboratories settings because the empirical studies in the laboratories setting are still in infancy. In particular, it would be useful for future researchers to replicate this study in laboratories in other settings such as in healthcare sector, and information technology sector. This would give a more comprehensive insight into the domain of green behavior in laboratories.

In addition, taking the result in this study as well as previous study conducted by Kim et al. (2019) and Weerarathna et al. (2017) where females tend to exhibit greater EGB than males, hence, it would be beneficial to focus on male respondents to verify the significance of gender in the themes of EGB.

It would be constructive for future researchers to employ triangulation techniques to verify the result. For example, focus group technique can be used to ensure the interactive exchange of thoughts amongst participants. While the observation technique could provide the details of respondents' behavior. These efforts may enrich our knowledge in EGB domains.

Last but not least, it is also desirable to conduct a quantitative study based on the resulted themes of this study. This would help to further develop a new measurement scale for future researchers.

5.5 Conclusion

The nature of work in academic laboratories includes tackling a problem or developing a scientific innovation, the side effect of which includes the consumption of energy and water, emissions of greenhouse gas and generating

waste. These outcomes have a detrimental influence on the environment. Thus, the main objective of this study is to explore in-depth the extent of EGB perceived by laboratory staff in academic laboratories located in the Kingdom of Bahrain. Following on, it aims to describe the impact of G-TFL on EGB as well as to comprehend the intervening mechanism between G-TFL and EGB.

These interviews were conducted via the virtual platform Zoom with participants working in academic laboratories. Participants were identified using a purposive sampling technique. The study employs ATLAS.ti 9 as the analysis tool and approaches the data with an inductive reasoning method.

Based on the research questions, the findings of this study are summarized below:

> **Research Question 1:** What is the meaning of green behavior for staff at academic laboratories?

After analysing the data of this question, five themes emerge: (I) conserving, (II) avoiding harm, (III) transforming, (IV) influencing others, and (V) taking initiative.

> **Research Question 2:** How does the green transformational leader/supervisor affect the green behavior amongst staff at academic laboratories?

After analysing the data of this question, G-TFL contains six themes that have impact on EGB amongst laboratories' staff namely: (I) visioning, (II) encouraging, (III) intellectual stimulation, (IV) high performance expectation, (V) individual support, and (VI) group goal. This study is in line with the tenets advocated in the Transformational Leadership Theory and supports the association between G-TFL and EGB.

Research Question 3: How do the individual green values interfere between green transformational leadership style and employee green behavior for staff at academic laboratories?

Participants mentioned two themes of the green values, which are the beliefs and the norms, which concurs with VBN Theory. The study found that leaders instill green values through advertisement campaigns, communication, habit formation, rules, and being a role model.

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Appendices

Appendix A: Interview Invitation Letter

Promoting employees' green behavior amongst laboratories' staff

Dear Sir/Madam:

You are invited to participate in my Master thesis entitled "**Promoting employees' green behavior amongst laboratories' staff**". The purpose of this study is to describe the environmentally friendly behavior in laboratories.

This study does not aim to evaluate your experiences. Rather, we are trying to learn more about your experience. Kindly be informed to facilitate our notes taking, the interview will be recorded. Nevertheless, only myself as a researcher of this study and my thesis advisor Dr. Choo Ling Suan will have access to the recording. The recorded data will be eventually destroyed after data analysis. No names of your institution or individual will be mentioned in the thesis. The record will be used for academic purpose only.

Your participation in this research is voluntary. There are a total of **THREE (3)** questions and the discussion will take approximately 60 minutes. I hereby attached the questions for your reference.

If you are willing to participate, kindly provide (X) on the preferred slot on the table below. Interview link with your preferred schedule will be sent to you soon.

Day\Date	Time		Preferred slot
Sunday 19 Sep 2021	a) 10:00 a.m. - 11:00 a.m. b) 12:00 p.m. - 1:00 p.m.	c) 1:30 p.m. - 2:30 p.m. d) 3:00 p.m. - 4:00 p.m.	
Monday 20 Sep 2021	a) 10:00 a.m. - 11:00 a.m. b) 12:00 p.m. - 1:00 p.m.	c) 1:30 p.m. - 2:30 p.m. d) 3:00 p.m. - 4:00 p.m.	
Tuesday 21 Sep 2021	a) 10:00 a.m. - 11:00 a.m. b) 12:00 p.m. - 1:00 p.m.	c) 1:30 p.m. - 2:30 p.m. d) 3:00 p.m. - 4:00 p.m.	
Wednesday 22 Sep 2021	a) 10:00 a.m. - 11:00 a.m. b) 12:00 p.m. - 1:00 p.m.	c) 1:30 p.m. - 2:30 p.m. d) 3:00 p.m. - 4:00 p.m.	
Thursday 23 Sep 2021	a) 10:00 a.m. - 11:00 a.m. b) 12:00 p.m. - 1:00 p.m.	c) 1:30 p.m. - 2:30 p.m. d) 3:00 p.m. - 4:00 p.m.	

If you require additional information or have any questions regarding this research, please contact me at: _____@gmail.com or my mobile no _____.

Thank you in advance for your co-operation and for taking the time to consider my request. I look forward to your reply.

Sincerely yours,
Yossra El-Tony

Appendix B: Interview Protocol

Green Behavior in Academic Laboratories

I'm pursuing my Master's degree in University of Bahrain. Conducting a research and thesis is partially requirement of the Degree. For this purpose, I am conducting a study to understand technicians' green behavior in laboratories. I am interested to know your real experience, responsibilities, thoughts and recommendations about green behavior in laboratories. I appreciate your participation in my study and I'm interested in hearing from you.

Here are some instructions:

-You and your institution will be named as pseudonym to ensure confidentiality.
-Your participation in this discussion is voluntary and you can leave at any time if you are not comfortable.
-This discussion will take approximately one hour.
-There is no right or wrong answer. Please feel free to share your experience.
-This discussion will be audio recorded for analysis purpose. Only my supervisor and myself have the access to this recording.
-The recording of this discussion will be discarded immediately at the end of this project.

Name of Institution:
Name of participant:
Location of Interview: On-line
Date:
Time and Length:

Guide to interview	Sub-questions
Part A: Introduction	
• Introduce my self • Inform participant's right • Explain study topic/ objective • Know the participants	Ice break questions Did you like online work? Are you ready for coming back? What do you prepare for this coming back? Can you share with me what is your daily job all about?
Part B: Body	
Q1: What is the meaning of green behavior for staff at academic laboratories?	**Q1:** What transferring behaviors do you experience in laboratory to shift from traditional to sustainable methods? **Q2:** What actions did you take to prevent the negative impact of your behavior in laboratory on environment? **Q3:** What have you done to preserve resource? **Q4:** How do you spread the urge to preserve environments to other? **Q5:** What initiatives did you take to improve the current situation? **Q6:** Do you have anything to add regarding your environmental behavior in laboratory?
Q2: How does the green transformational leader/supervisor affect the green behavior amongst staff at academic laboratories?	**Q1:** What are the actions have been taken by your supervisor that affect technician's environmental behavior at laboratories? **Q2:** How do you think that your supervisor can inspire you to be more engaged in environmental behavior? **Q3:** Is there any additional comments you want to add regarding the role of supervisor?
Q3: How do the individual green values interfere between green transformational leadership style and employee green behavior for staff at academic laboratories?	**Q1:** What is your belief regarding saving the environment? **Q2:** Do you think that your beliefs about saving the environment are translated into your actions? Give examples? **Q3:** How actions that have been taken by your supervisor affect your values about environmental behavior at laboratories? **Q4:** Is there any additional comments you want to add regarding your personal green value and your green actions?

Part C: Closure	
Q1. If you have a chance to propose a new environmental behavior, what would you suggest? **Q2**. What would you like from your supervisor to enhance the current situation? **Q3**. What do you think regarding the role of personal's value in this issue? **#4.** Demographic questions (Appendix C) **Q5**. Would you like to share\add anything else? **#6.** Thanks for time/ opinion	

Appendix C: Demographic Questions

Questions

Q1\ What is the highest degree of education you have completed?

A. Diploma Degree
B. Bachelor's Degree
C. Master's Degree
D. Ph.D.

Q2\ What is your current position?

A. Technician
B. Research assistant
C. Senior technician

Q3\ How many hours do you work in a laboratory per WEEK on an average?

A. Less than 5 hours
B. 5-10 hours
C. 11-15 hours
D. 16-20 hours
E. More than 20 hours

Q4\ How many years of experience do you have in laboratory work?

A. 1-3 years
B. 4-6 years
C. 7-10 years
D. More than 10 years.

Q5\ What is your age?

A. 20-25 years old
B. 26-30 years old
C. 31-35 years old
D. 36-40 years old
E. 41-45 years old
F. 46-50 years old
G. 51-55 years old
H. 56-60 years old
I. Over 60

Q6\ What is your gender?

A. Male
B. Female

Thank you for taking the time to complete this interview.

Appendix D: Timetable of Interviews

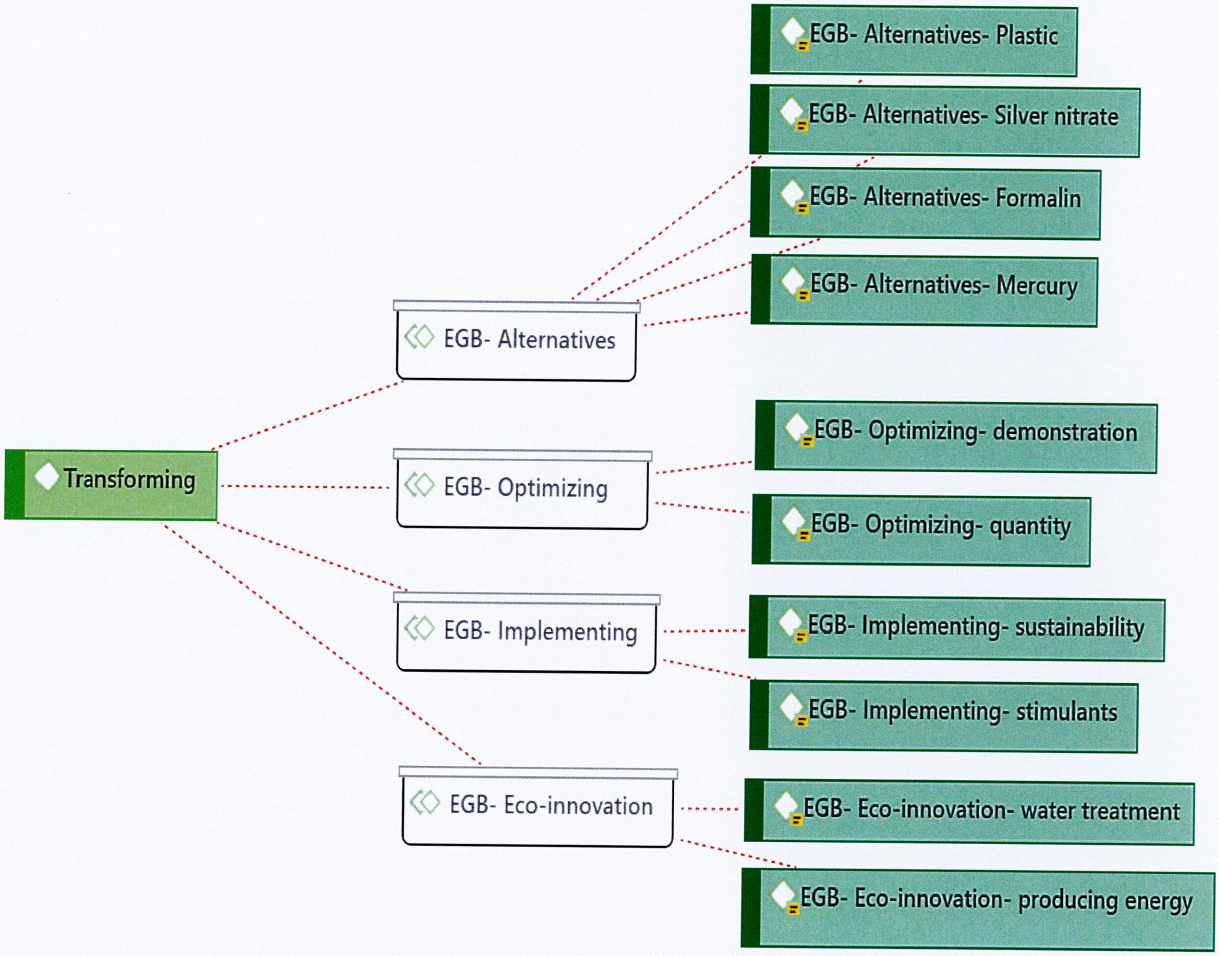
No	Interviewee' name	Code	Mob	Email	Date	Time	Zoom ID	Duration
1	----	P1	----	<--- @gmail .com>	Sunday 19 Sep. 21	10-11 a.m.	Meeting ID: 865 5558 6063 Passcode: --	23 min
2	----	P2	----	<--- @hotmail.com >	Monday 20 Sep. 21	11-12 p.m.	Meeting ID: 868 9656 8414 Passcode: --	21 min
3	----	P3	----	<--- @-- .edu.bh >	Tuesday 21 Sep. 21	9:45-10:45 a.m.	Meeting ID: 868 9656 8414 Passcode: --	21 min
4	----	P4	----	<---@-- .edu.bh >	Wednesday 22 Sep. 2021	10-11 a.m.	Meeting ID: 861 6788 1125 Passcode: --	32 min
5	----	P5	----	<---@-- .gov.bh >	Wednesday 22 Sep. 2021	12:30-1:30 p.m.	Meeting ID: 822 7083 9333 Passcode: --	48 min
6	----	P6	----	<--- @gmail .com>	Thursday 23 Sep. 2021	9-10 a.m.	Meeting ID: 897 7598 7328 Passcode: --	41 min
7	----	P7	----	<--- @gmail .com>	Thursday 23 Sep. 2021	10-11 a.m.	Meeting ID: 815 5537 1381 Passcode: --	30 min
8	----	P8	----	<--- @gmail .com>	Thursday 23 Sep. 2021	12-1 p.m.	Meeting ID: 844 3182 1627 Passcode: --	34 min
9	----	P9	----	<--- @gmail .com>	Thursday 23 Sep. 2021	4-5 p.m.	Meeting ID: 834 3241 3137 Passcode: --	32 min

Appendix E: Template of Notes per Participant

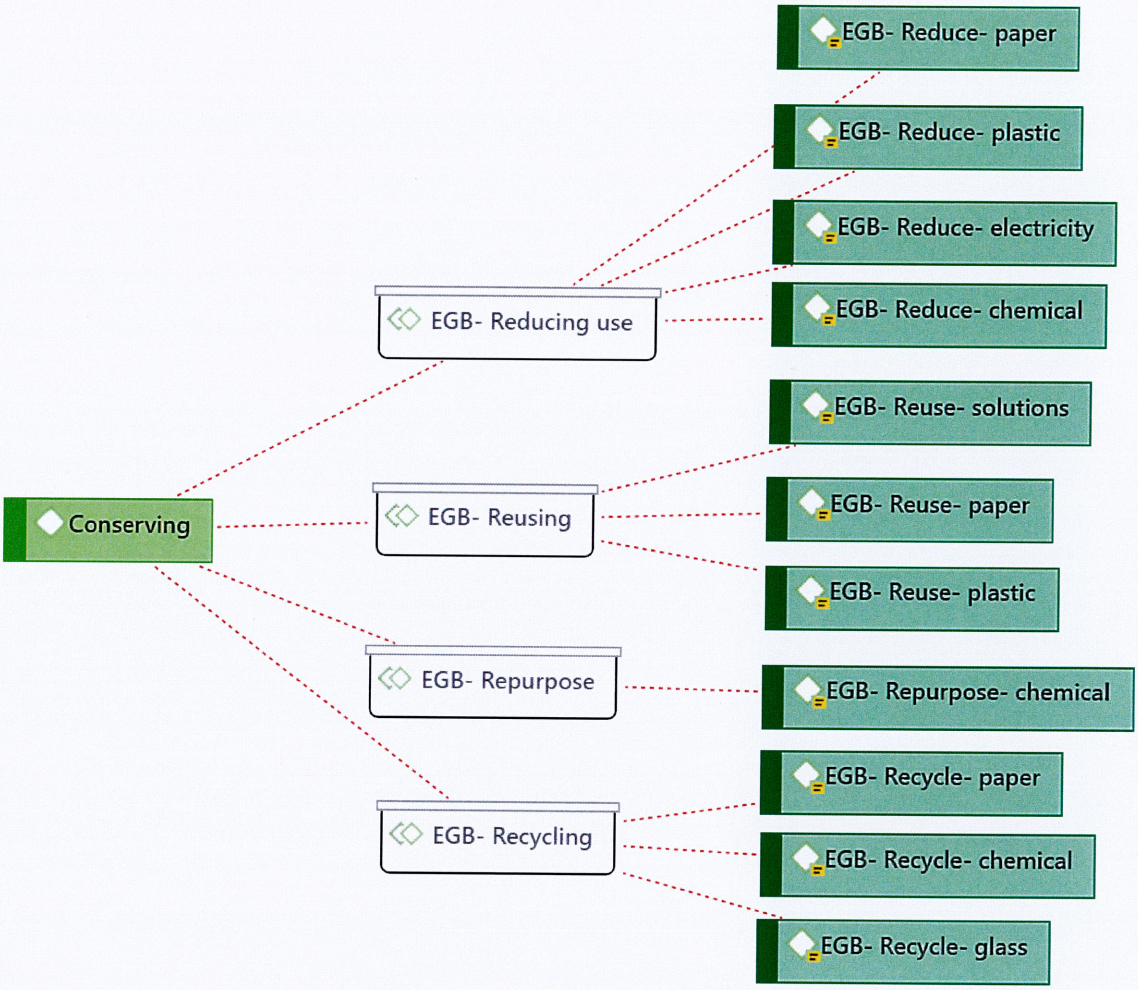
	Researcher's Notes	Researcher's additional questions
Name		
Code		
Institution:		
Laboratory		
Location		
Date \Time\ Length		
Part A: Introduction		
Ice break Q		
Part B: Body		
Q1:		
Q2:		
Q3:		
Part C: Closure		
Close		
Personal Q		
Thanks\ comments		

Appendix F: Themes of EGB

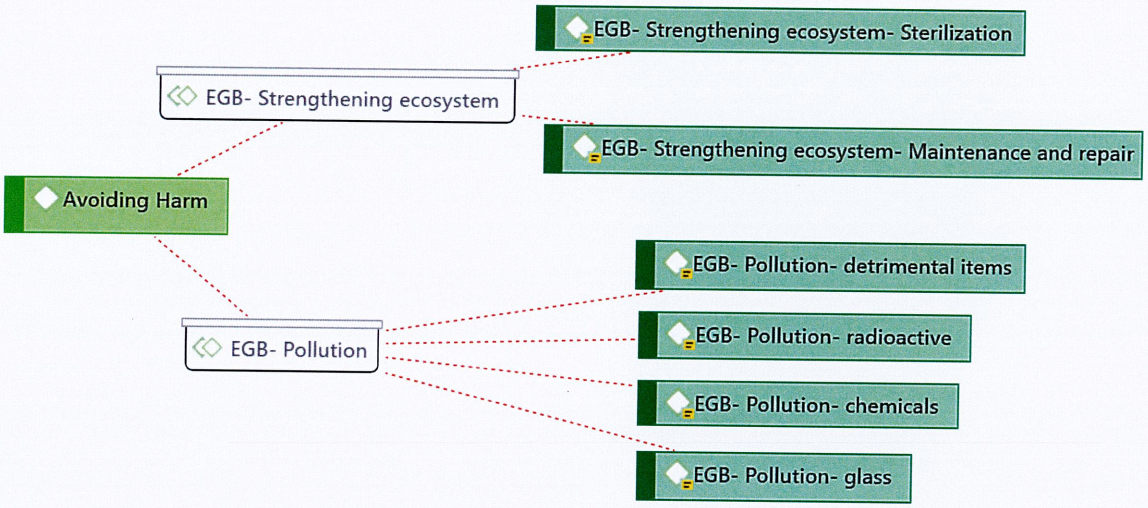
Transforming theme



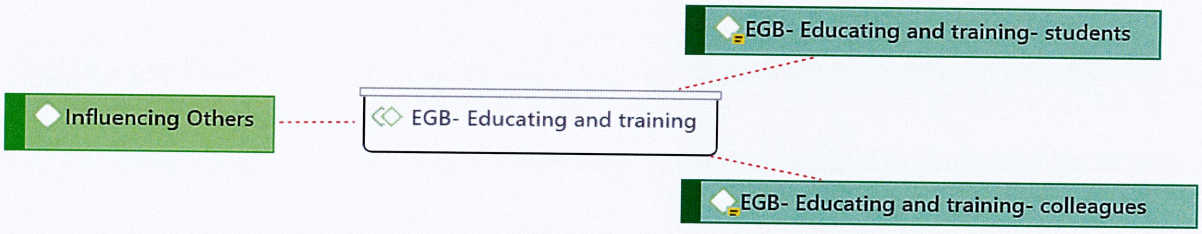
Conserving theme



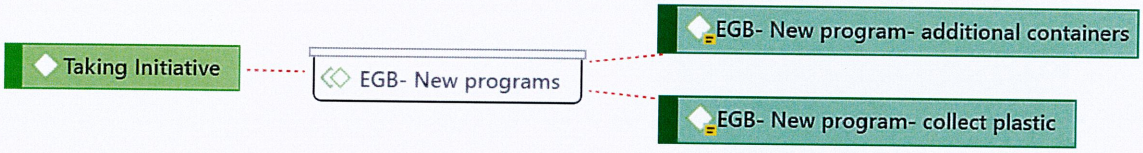
Avoiding Harm theme



Influencing Others theme

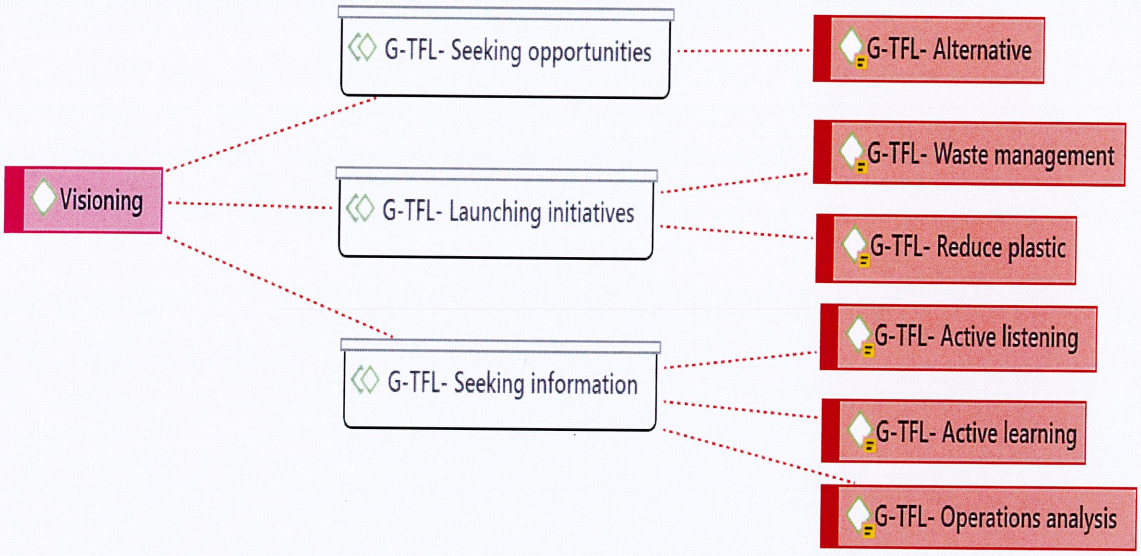


Taking Initiative theme

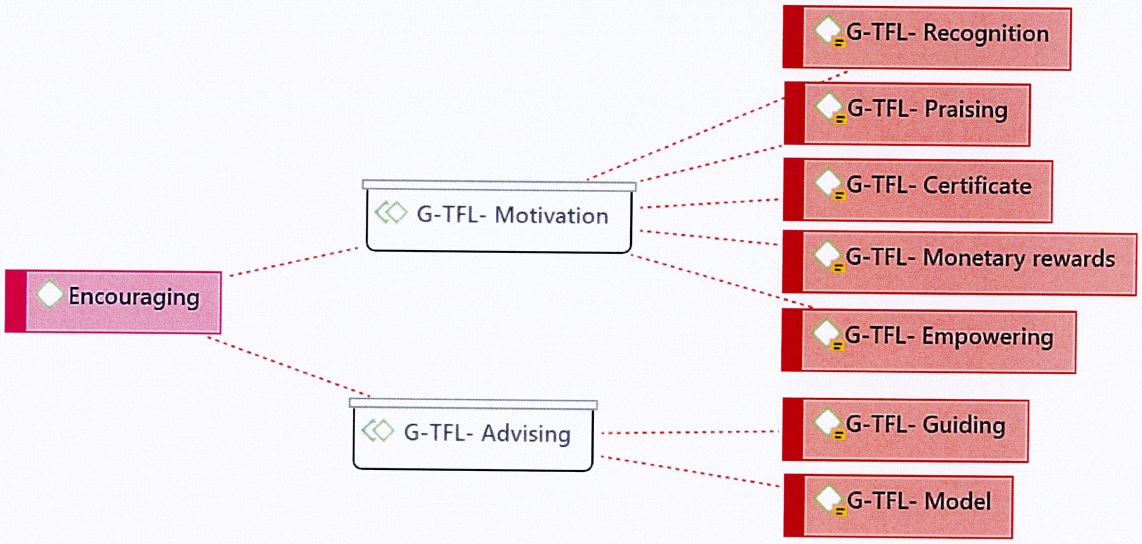


Appendix G: Themes of G-TFL

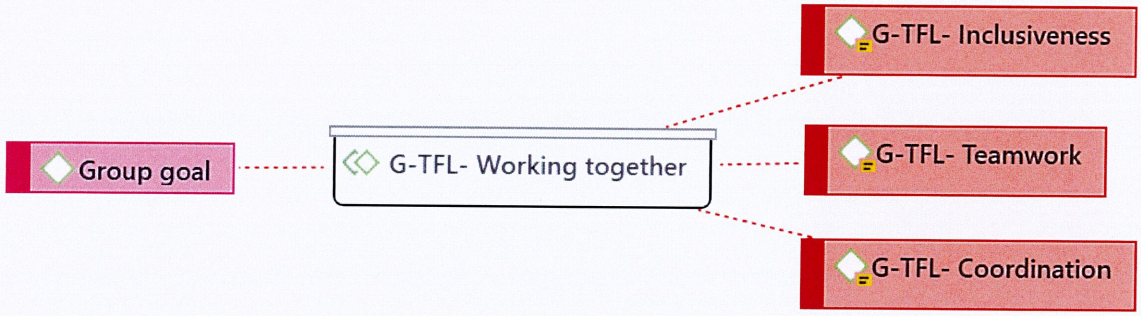
Visioning theme



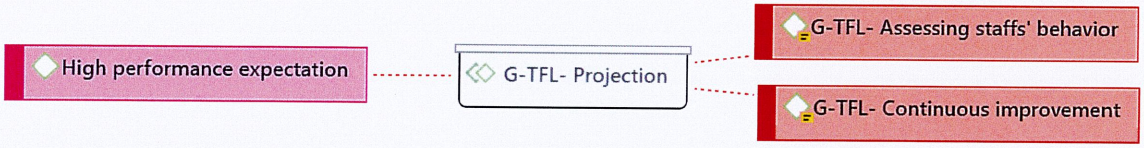
Encouraging theme



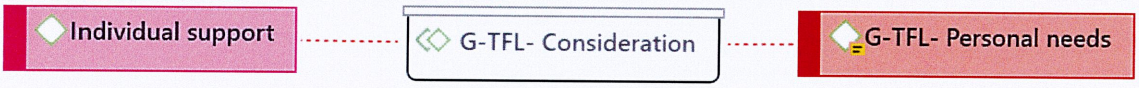
Group goal theme



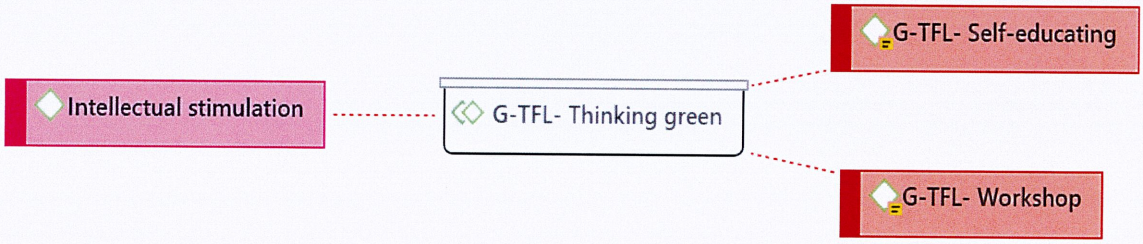
High performance expectation theme



Individual support theme

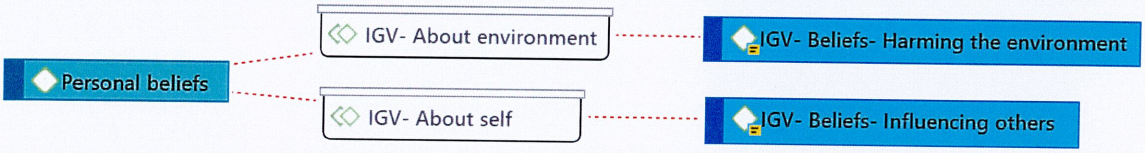


Intellectual stimulation theme

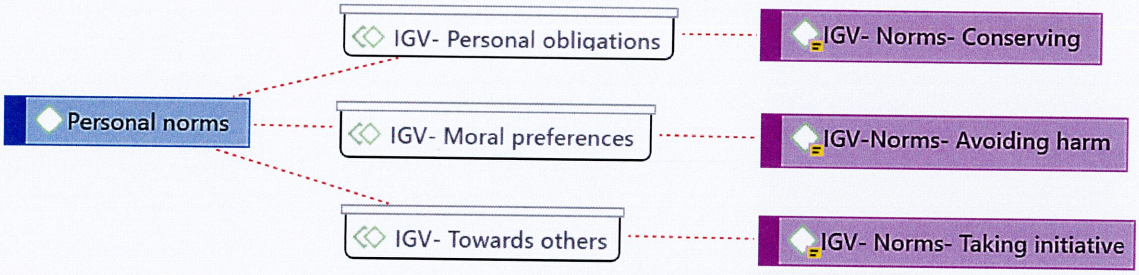


Appendix H: Themes of IGV

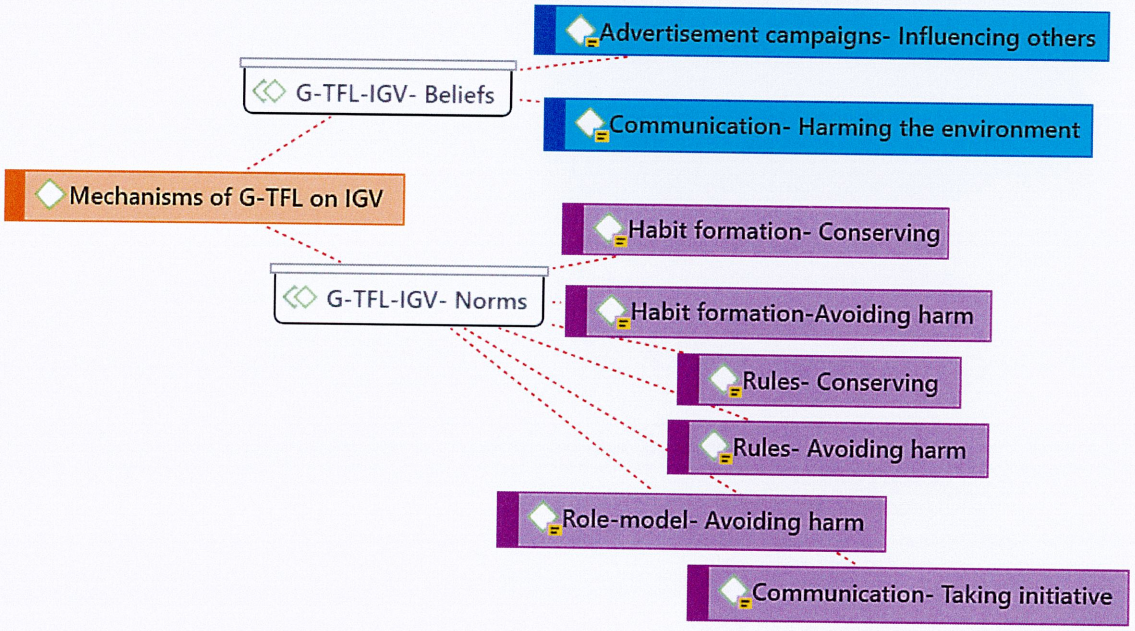
Personal beliefs theme



Personal norms theme



Mechanisms of G-TFL on IGV theme



الملخص

يلعب البحث العلمي دورًا محوريًا في تقدم الأمم. وبالرغم من ذلك، هناك آثار ضارة على البيئة من بعض ممارسات المعامل الأكاديمية. الهدف من هذه الدراسة هو استكشاف السلوك الأخضر للموظفين العاملين في المختبرات الأكاديمية في مملكة البحرين. يهدف الباحث من خلال هذه الدراسة إلى شرح تأثير أسلوب القيادة التحويلية الخضراء على السلوك الأخضر للموظفين، وكذلك كيفية هذا التأثير للقيادة التحويلية الخضراء على السلوك الأخضر للموظفين. اعتمدت هذه الدراسة على النهج النوعي. تم جمع البيانات في هذه الدراسة عبر أسئلة معمقة خلال مقابلات تم إجراؤها عن بعد. تم استخدام أسلوب أخذ العينات العمدي في هذه الدراسة لتحديد المشاركين حيث تم جمع البيانات من تسعة أفراد يعملون في المختبرات الأكاديمية في مملكة البحرين. تم تحليل البيانات التي تم الحصول عليها باستخدام برنامج اتلس تي، النسخة التاسعة. ظهرت خمس موضوعات للسلوك الأخضر للموظفين: (1) المحافظة، (2) تجنب الأذى، (3) التحول، (4) التأثير على الآخرين، (5) أخذ المبادرة. وجد أيضًا أن السلوك الأخضر للموظفين يتم تحفيزه عندما أظهر القادة (1) الرؤية، (2) التشجيع، (3) التحفيز الفكري، (4) توقعات الأداء العالي، (5) الدعم الفردي، و (6) أهداف للمجموعة، وهذا ما يميز القيادة التحويلية الخضراء. بناءً على النتائج التي تم الحصول عليها، تم اقتراح بعض التطبيقات الإدارية.

الكلمات المفتاحية: السلوك الأخضر للموظف، القيادة التحويلية الخضراء، القيم الخضراء الفردية، المختبرات ، مملكة البحرين.

جامعة البحرين

كلية إدارة الأعمال

قسم الإدارة والتسويق

تعزيز السلوك الأخضر للموظفين العاملين بالمختبرات: دور القيادة التحويلية الخضراء والقيم الخضراء

أطروحة مقدمة كجزء من متطلبات الحصول على درجة الماجستير في إدارة الأعمال

إعـــداد

يسرا فريد التوني

الرقم الجامعي: ٢٠٠٥٢٧٧٩

إشـــراف

د. شو لينج سوان

أستاذ مساعد

جامعة البحرين

مـملكة البـــحرين

يوليو ٢٠٢٢م