

Triple Helix Approach: Collaboration towards Green Procurement Implementation in Construction Projects

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ABSTRACT

In line with the Agenda 21 in promoting sustainable development worldwide, addressing environmental, social and economic issues, several initiatives and strategies were introduced to ensure that these issues can be solved. The sustainable agenda also outlines a set of principles, objectives and action which encourages a participatory and collaboration approach which involves various stakeholders in the sustainable practices. Focusing on the construction sector, the environmental problem caused by this sector has a huge impact on the environment. Hence it is important to develop sustainable construction practices to ensure that the environment is well protected. The current situation in construction industry requires a paradigm shift from conventional practice to a greener approach. Green procurement was introduced as one of the strategies to maintain and minimize environmental impacts produced by products and services. However, green procurement cannot be achieved by organizations in isolation: in fact, it requires collaboration of all construction stakeholders. The objective of this study is to explore the nexus of Triple Helix Approach (THA) in fostering collaborations with the government, academican, and construction stakeholders towards green procurement implementation in construction project. The study uses focus group discussion to explore the collaboration among these three stakeholders and Atlas.ti was used to analyse the findings. The outcome of this study will provide information on the way Triple Helix approach can promote collaborations towards green procurement implementation in construction projects.

1. Introduction

Construction industry is one of the major contributors to overall economic growth since it provides infrastructures and physical facilities such as residential, commercial, education, health, recreational and manufacturing for people [1]. In the National Construction Policy 2030 it is stated that construction sector creates a huge impact on the environment and causes environmental problems such as air and water pollution, destruction of natural habitats, harmful chemicals [2] landfill waste from the construction waste [3], climate change [4] and increase in the spread of energy

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crisis and excessive consumption of global resources [5]. Aligning with Sustainable Development Goals (SDGs) in the context of global state, construction industry needs to implement sustainable development throughout the life cycle of construction stages. One of the strategies is to implement is the green procurement.

The construction industry requires a paradigm shift from the conventional to a greener approach. This also involves the construction procurement process. The conventional construction procurement is a process that enables clients to obtain goods and services for construction and the process should be fair, transparent, competitive and cost effective in order to deliver value for money [6]. The industry has evolved throughout the year and introduction of green procurement has been highlighted as one of the strategies to maintain and minimize environmental impacts produced by products and services. Implementing new practices and culture of change is fundamental and it is the key to achieving environmental sustainability.

Construction projects involve diversified and complex supply chains which have different phases and lengthy processes: all of them involved various stakeholder's interaction, collaboration, and negotiations [7]. Green procurement cannot be achieved by organizations in isolation as it requires collaboration of all construction project stakeholders [8].

2. Green Procurement

2.1 Green Procurement Definition

Green procurement can be defined as purchasing of products and services that mitigates the potential threat to the environment and human health [9]. Green Procurement was first introduced in National Technology Policy (NGTP) 2009 and the concept was established under MyHijau Programs in 2012 under the Ministry of Energy, Green Technology and Water (KeTTHA) and Malaysia Green Tech Corporation (MGTC).

Green procurement has evolved throughout the years and was mentioned in the 10th Malaysia Plan, 11th Malaysia Plan and 12th Malaysia Plan which encourage green process and utilization of green products and services, as well as development of Government Green Procurement (GGP) Guidelines.

As for the government green procurement, it refers to an acquisition of products, services, and work that consider environmental criteria and standards [10]. As for green procurement for work, it encompasses the minimization of the environmental impacts of construction works in phases of the building's life-cycle and other physical infrastructures [11].

2.2 Current Situation of Green Procurement

According to Razali *et al.*, [12], green procurement remains inadequately assessed and not widely recognized within organizations, firms, or individuals in the construction sector. Therefore, several initiatives and strategies have been introduced by the government in promoting green procurement in their policies. The National Construction Policy 2030 also emphasizes on Thrust 2 on embracing sustainable environment: it focuses on green procurement especially in improving procurement systems for public projects in implementing Government Green Procurement (GGP).

Organizations cannot attain sustainability and green practices in silo: it requires the collaboration of stakeholders especially the government, academicians, and industry. The relationship among these stakeholders is crucial in ensuring the green procurement can be implemented. To understand the connection among these stakeholders towards the green procurement implementation, a triple

helix model was used to see the interconnection and interdependencies among the government, academicians, and industry.

3. Triple Helix Model

Triple Helix model was developed by Leydesdorff and Etzkowitz [13] which serves as framework to comprehend the connections and interdependencies among the government, science and industry which highlight on collaborative efforts in promoting innovation.

The benefits of Triple Helix interaction enable knowledge exchange among the stakeholders and fosters innovation. Moreover, collaboration among the government, academicians, and industry in the implementation of green practices such as green procurement in construction projects will ultimately benefit both the environment and the construction industry. The Triple Helix approach towards the green procurement implementation views the strength of the linkages amongst various stakeholders as a crucial factor towards green procurement implementation.

3.1 Government

The government plays an important role to ensure that the green procurement can be implemented in construction industry. In terms of delivering a project, it is important to have a shared sense of purpose and directions that guides the organization's goals and objectives. These are important in collaboration to ensure that all parties involved in a project have clear understanding and direction of what is anticipated, required, and agreed upon [14].

As stated by Bohari *et al.*, [15], the government must ensure that the construction industry understands and is aware of the introduction of the green policy and guidelines. This policy and guidelines will assist every stakeholder in construction projects as it functions as a tool to ensure compliance and provide guidelines for green procurement implementation. Moreover, Bohari *et al.*, [16] highlighted that educating the industry is important to drive the acceptance among the stakeholders in construction industry especially the knowledge on green concept through regulatory frameworks, incentives, and environmental standards provisions. Yi and Qiang [17] also highlighted that the government intervention through policies, initiatives and incentives can help in promoting and empowering construction stakeholders to implement green procurement in construction project.

Suliantoro and Fitriani [18] also emphasized on the fact that the government should prioritize knowledge enhancement and awareness of procurers on government green procurement, emulating best practices, application of change management, and introduction of stakeholders incentives to overcome the barriers on the green procurement implementation. Therefore, these strategies can be made by collaborating with the academic industry whereby the academician can conduct research on sustainable practices such as green procurement and collaborate with the industry to share knowledge and best practices. Raising awareness on the importance of green procurement and its impact on sustainable development is the focal point of the researchers nowadays [19].

3.2 Academician

Academic industry which includes the academia in universities or research institutions also play an important role in spreading the awareness and disseminating the knowledge on green practices such as green procurement to the construction stakeholders who are involved in construction projects through research, training, and education programs. The government must get the

academician who are experts in the green procurement delivery to give training and education programs for construction stakeholders on green procurement to promote sustainable practices in construction industry. Marcelline *et al.*, [20] emphasized that these programs can assist the construction stakeholders to understand the concepts and benefits of green procurement, challenges, barriers, and potential resolutions for the implementation. Moreover, the academician can provide guidance on incorporating green procurement practices into project procurement processes and supply chain management.

By providing the construction stakeholders with the essential knowledge and skills, these initiatives on giving training programs or seminar can be crucial in promoting the importance of green procurement practices and achieving sustainable development goals within the construction industry [19,21] that are in line with Agenda 21.

3.3 Industry

As for industry, it is mainly focused on construction stakeholders which involved the companies and suppliers. According to Bohari *et al.*, [22], to shape green orientation of construction procurement, the stakeholder values have a significant role and positive influence towards the green procurement. These include the stakeholder's commitment, technical competencies, awareness, and knowledge sharing on the green procurement implementation in construction projects.

Although the implementation of green procurement in the Malaysian construction industry is still in its infancy [12], there are strategies and initiatives highlighted in the Malaysia Plan by the government such as the establishment of Green Government Guidelines for the industry to incorporate in project development. Eventually, the government provides support in terms of policies, initiatives and strategies which serve as the starting point for construction industry to implement green procurement. In the Twelfth Malaysia Plan (12MP) 2021-2025, the government mentioned that a short-term action plan and guideline green procurement on work especially for the construction industry will be introduced. These will be used as a reference by the government construction project stakeholders which comprises of five (5) phases of construction namely, inception and planning phase, design phase, tendering phase, construction phase, and close-out and occupancy phase.

With these guidelines, the construction stakeholders can implement green procurement practices by incorporating purchasing products and services that are environmentally friendly, incorporate sustainable construction methods and technologies. Therefore, implementing a pilot project for green procurement is important because it can significantly improve the delivery of the project development, identify, and address the challenges involved, as well as provide a basis for future research and implementation of green procurement practices in construction industry [19]. Additionally, the construction stakeholders that are involved in the implementation of green procurement for the pilot project can share feedback and insights with the government and academia to improve green procurement processes.

Therefore, the triple helix model which consists of the government, academia and industry plays a crucial role in the implementation of green procurement. The collaboration among these three (3) actors can drive the implementation of green procurement, enhance the level of green initiatives, influence top management, and guide the implementation of green procurement strategies.

4. Methodology

This study adopts a qualitative method approach by using focus group discussion as a data collection method. The sampling technique used is a purposive sampling method where the participants consist of construction stakeholders from the public, private sector, and academia. Fifteen (15) participants were involved in the focus group discussion and the participants were divided into two groups. The inclusion criteria of the participants are the construction stakeholders (clients, architect, engineers, quantity surveyors and academia) who are involved in green construction development, procurers, and green facilitator. From the focus group discussion, the data were transcribed and then analyzed using Atlas.ti. The data were analyzed according to the role of each of the triple helix nexus such as the government, academia, and industry towards the green procurement implementation. From the data analyzed, findings will provide insights on how Triple Helix approach can promote collaborations towards green procurement implementation in construction projects.

5. Results and Discussion

From the literature, findings emphasized that these three (3) actors are significant in driving the implementation of green procurement. From the focus group discussion, the role of these three (3) actors were identified and the data from the literature and focus group discussion will then be synthesized. The Atlas.ti network diagram was derived from the focus group discussion.

5.1 Triple Helix Approach – The Government Role

Figure 1 shows the results from the focus group discussion on the government role as one of the actors to drive the green procurement implementation in construction industry. The participant mentioned that client such as the government plays an important role in their decision in green practices.

“The clients play important role in their decision whether to implement green practices or not.” (P7)

“Paymaster really hold the power towards the green procurement implementation.” (P7)

“The instruction and statement coming from the client to implement green procurement.” (P3)

“The green procurement must be mandatory.” (P10)

From these statements it can be concluded that participants highlighted on the importance of power and authority of the government in enforcing the policy and making it mandatory for the green procurement implementation. The decision must come from the clients and other stakeholders will follow suit. Supported by Bohari *et al.*, [15], government intervention in terms of policies help to promote to the construction stakeholders to implement green procurement.

Moreover, most participants agreed that the client or government must have a green mindset and be environmentally conscious to ensure that green procurement can be implemented.

“Client that has green mindset is usually someone who has a holistic approach to green where he/she considering and addressing the interconnected aspects of environmental impact throughout the lifecycle operation of the building.” (P10)

“The client must have green mindset or environmentally conscious.” (P11)

“The ministries that taking care on green must really understand on the green and have green mindset.” (P10).

It is important to have an awareness on the importance of environmental situation and to also be environmentally conscious especially for construction stakeholders because construction industry is one of the major contributors to the environmental impacts through its activities. When the construction stakeholders have the consciousness, it will then lead towards the will to implement green practices in the construction projects development.

Additionally, the participants also emphasized on the importance of having the same vision between the client or government in driving towards greener approach in construction projects.

“Same vision direction between clients and consultants will drive the greener approach construction projects.” (P10)

“Committee that represent the client and each consultant as a push factor, and this also can motivate them as a starting point towards greener approach in their practices especially towards clearer vision and clear sense of purpose and relationship among the construction stakeholders.” (P5)

To ensure that the project objective can be achieved successfully, it is important to have clearer and similar vision among the construction stakeholders as a starting point to implement green practices. Leydesdorff and Etzkowitz [13] also mentioned that to deliver a project, it is fundamental to have shared sense of purpose and directions to guide towards organization’s goals and objectives.

Another point highlighted by the participants is the incentives. The consideration in giving incentives to construction stakeholders that implement green practices also matters for the construction stakeholders.

“Green incentives not necessary the tax exemption, letter of appreciation, certificate, award.” (P8)

P8 highlighted those rewards and incentives are not necessarily monetary rewards but they can also be non- such as letter of appreciation, certificate and awards for the construction stakeholders who implement green practices in their projects. Both authors [15] and [16] emphasized that to educate and encourage acceptance among construction stakeholders on green concept are carried out through the initiative of giving incentives. Therefore, it is important to go through the needs of giving incentives to the construction stakeholders.

As for the green procurement, the primary focus that needs to be addressed is the substantial issue on knowledge of the construction stakeholders. This is where the role of academia comes into the picture: that is to help the government to disseminate the knowledge and information on green concept and initiatives that have been introduced to the industry.

Academic industry is one of the important actors to spread the awareness, and consciousness on green procurement so that this will indirectly lead towards the implementation of green procurement.

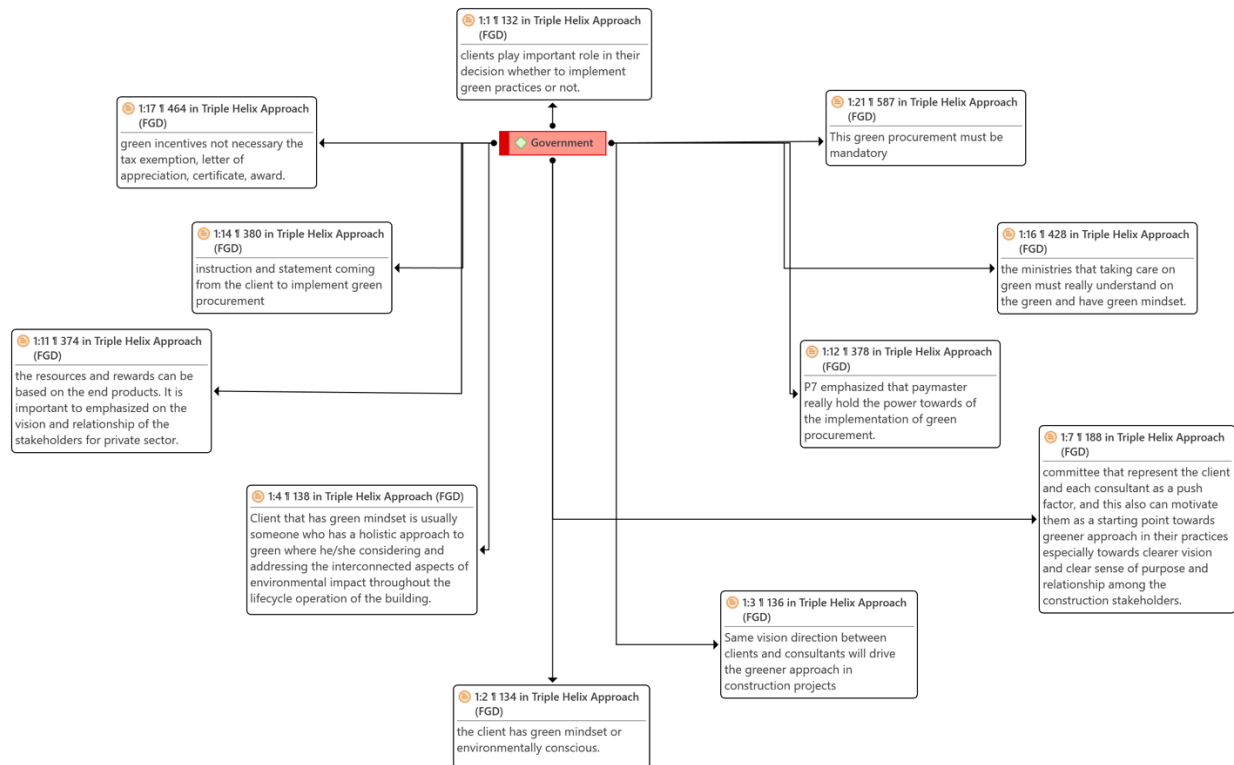


Fig. 1. Government role

5.2 Triple Helix Approach – The Academic Industry Role

Figure 2 network expressed the participants opinions on the green procurement implementation. Most of the participants agreed that the biggest issue on implementing new approach in construction is the lack of knowledge of the construction stakeholder itself.

“The consciousness, situation, awareness, knowledge will influence the decision on the green procurement implementation and the important part is to instill the green procurement awareness among the them because it is crucial to ensure that they know the benefits or consequences of implementing green procurement” (P7)

“Consultants in the project teams need to be educate and give them awareness on green procurement because there are still some of the construction project stakeholders that lacking in terms on knowledge on what is green procurement.” (P3)

“Client must understand the green standard rating tools and must have green training.” (P15)

From the participants’ statements, it can be concluded that the needs of education for the construction stakeholders are fundamental. The importance of education becomes evident when implementing on new practices as this will equip the construction stakeholders with necessary knowledge, skills, and insights to navigate them throughout the construction phases. Moreover, when they have knowledge and understand the importance, benefits, and consequences of

implementation of green procurement, the move towards the need and intention to implement the practice would be accomplished. Furthermore, getting the academicians who are expert in green procurement to be involved can help in terms of giving training program or seminars to the construction stakeholders. This notion is supported by Khaderi *et al.*, [19] who stated that the training program can assist the construction stakeholders in the industry in understanding the principles and potential benefits of green procurement as well as addressing the challenges, barriers, and potential solutions for effective green procurement implementation.

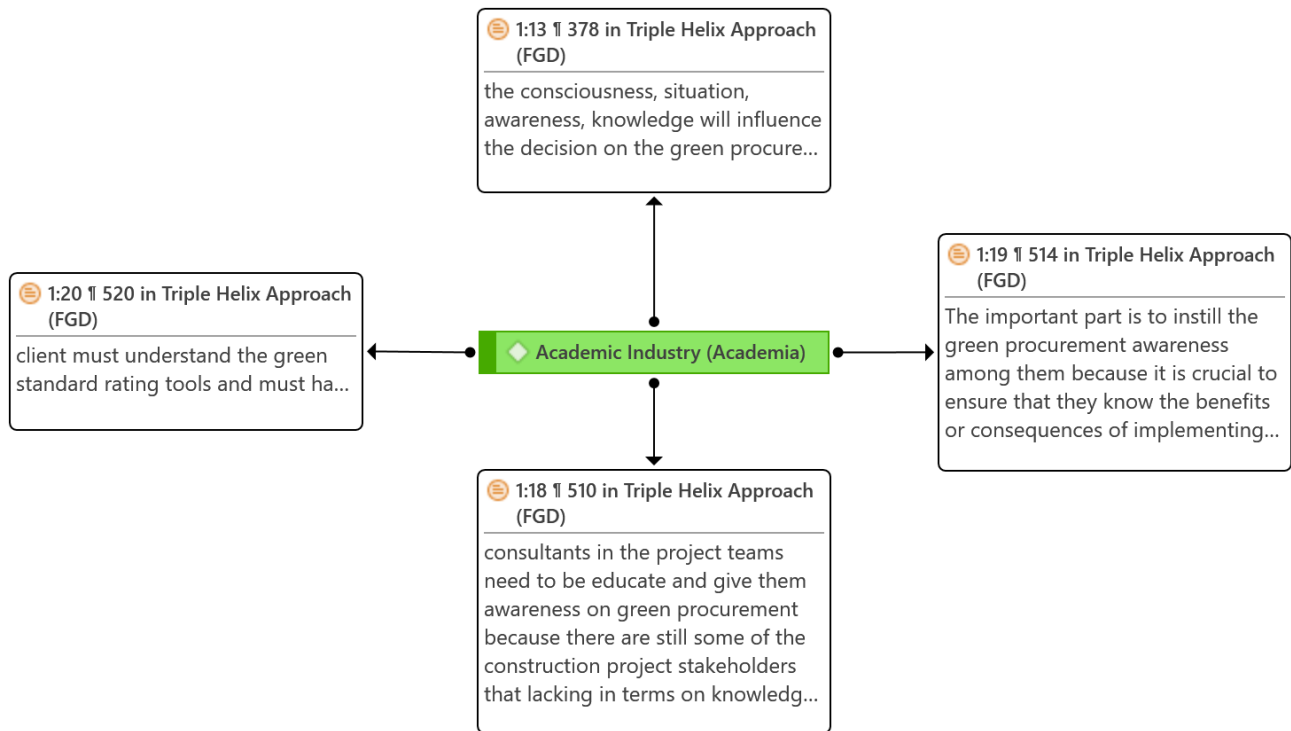


Fig. 2. Academic industry role (academia)

5.3 Triple Helix Approach –The Construction Industry Role

Figure 3 expressed the concerns and opinions from the participants. Focusing on the construction stakeholders, they are the important actors in managing the whole construction project phases. Their collective involvement ensures that the project aligns with the goals, meet the quality standards, budget, and timelines. The collaboration among construction stakeholders is integral to achieve project success. Therefore, these are the matters pointed out by the participants.

“Same vision direction between clients and consultants will drive the greener approach in construction projects.” (P10)

“Organizational structure plays important role to carefully structure capture in terms of the knowledge and awareness of the construction stakeholders.” (P7)

“Top management must support and understand on the proposed green implementation because the instruction come from top to bottom.” (P10)

These three statements mentioned the same vision between stakeholders can be the drive for a greener approach in construction projects. As mentioned earlier, shared vision among teams is crucial to ensure the success of the project. The top management commitment and support are also essential to instill the knowledge and awareness of the team on green procurement. Clear instructions transfer and communication is also important because the construction industry involves diverse stakeholders, and they need effective communication especially in decision making during each construction phase to achieve consensus among the stakeholders.

“Design teams, the architect, engineers, and contractors to be involved in decision making during planning and design phase to achieved consensus among the stakeholders.” (P1)

“It is important to have a culture of improvement, inculcate green slowly as a strategy towards innovation for the project.” (P7)

Moreover, the implementation of green practices in construction will evolve throughout the years. Therefore, P7 explained that in terms of delivery of the process and performance evaluation on green procurement, especially in terms of products, there is the need to have a culture of improvement as a strategy towards innovation.

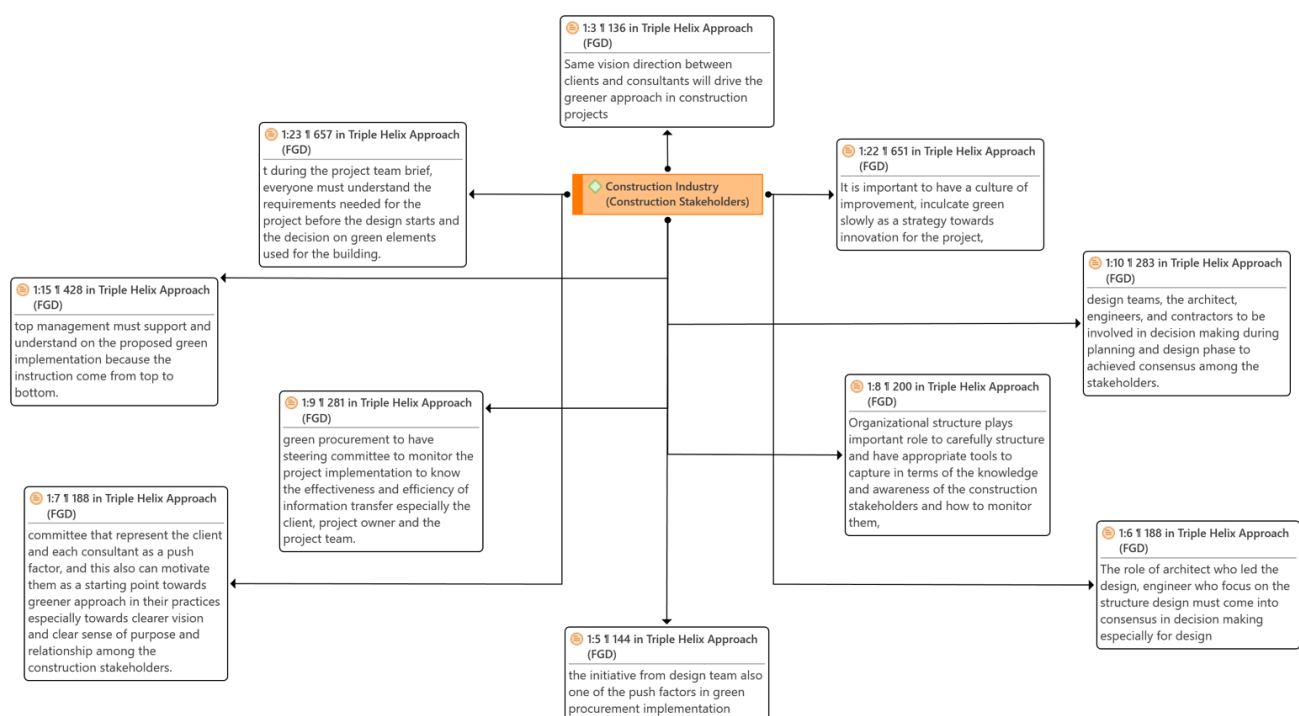


Fig. 3. Construction industry role (construction stakeholders)

In the context of green procurement implementation, based on the analysis that is derived from the focus group discussion on the triple helix approach, these parties could collaborate to develop and implement green procurement practices, promoting innovation in environmentally friendly products, services, and technologies. The triple helix approach can be summarized in Figure 4.

The Atlas.ti network analysis from the focus group discussion provide insights into the way the Triple Helix approach can foster collaborations, innovation, knowledge exchange, and collective commitment to green procurement implementation in construction projects. Successful implementation requires collaboration and commitment from all construction stakeholders. The

government, as a critical actor influences construction stakeholders through policymaking, enforcement, incentivization, and the development of related guidelines on green procurement. The collaborative relationship between the government and academia is needed to provide training and education to construction stakeholders as it is crucial to encourage them to be environmentally conscious in their practices. Academia plays an essential role as the contributor to this collaborative effort such as raising awareness, disseminating knowledge, and bridging information and knowledge gaps among construction stakeholders to drive the necessary shift from conventional practices to greener practices. Construction stakeholders form the third pillar of the Triple Helix. Their participation and involvement are required for the successful implementation of green procurement. The need for a shared vision among stakeholders, effective communication and top management support emphasizes the collaborative nature of the Triple Helix approach. Therefore, the application of the Triple Helix approach in fostering collaboration among the three actors in construction – the government, academia and construction stakeholders are essential for paradigm shift towards sustainability and ultimately benefiting both the environment and construction industry.

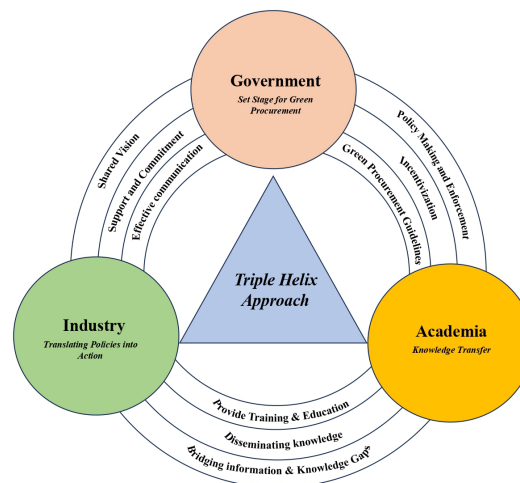


Fig. 4. Triple Helix approach summary

6. Conclusion

In conclusion, the Triple Helix approach emphasizes interaction and interdependencies among three (3) crucial actors, to drive the implementation of green procurement. In line with Agenda 21, which advocates sustainable development, particularly within the construction industry, the activities associated with construction are prone to have environmental impacts. Hence, it is essential to shift from conventional practices to a greener approach. Green procurement has been introduced as a strategy to address environmental issues in construction. The Triple Helix approach stands as a powerful framework in uniting diverse stakeholders for shaping a greener and more sustainable future for construction projects as well as contributes positively to the global goals of sustainable development.

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