

# Antecedents of Green Warehousing: A Theoretical Framework and Future Direction

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**Abstract—** In today's competitive logistics environment, 'green' and sustainable approaches are gaining academic interest. This paper aims to develop a theoretical framework to enhance understanding and academic knowledge on the antecedents of green warehouse practices (GWP). This paper employs content analysis approach to extract the potential factors to GWP. It then reviews and synthesises the GWP factors by applying two prominent management concepts of stakeholder and institutional theories. Through the review and discussion, six GWP factors; employee involvement, top management commitment, owner support, governmental pressure, industry competition, and customer demand are highlighted. Additionally, six propositions of GWP are presented and the framework developed in this conceptual paper underlines the internal and external GWP instigators. The conceptual nature of this paper offers a preliminary insights of GWP where the synergy between external and internal elements must coexist to successfully implement GWP. The developed theoretical framework presents a platform for future empirical GWP studies.

**Keywords—** Warehousing; Green Warehouse; Logistics; Supply Chain; Stakeholder Theory; Institutional Theory

## 1. Introduction

Over the years, logistics scholars and research have focused on the needs of green approach, in particular, the green industrial building practices. Such research has focused on the issues, importance and contributions of green industrial building practices among logistics organisations [1], [2], [3], [4], [5].

In the logistics industry, green industrial buildings practices are commonly associated with green warehouse practices (GWP) and it is important to study GWP as it brings positive impact to the environment, economy, and societies [6]. Additionally, because of the increasing pressure and environmental concerns over carbon footprint, the need for GWP within the logistics industry is of main priority.

GWP is an important element in the overall logistics system after transportation services [1]. Furthermore, scholars agreed that the practice of green warehousing is employee centric as it regards the safety and wellbeing of workers in warehouse environments [7], [8], [9]. As the function of warehouse is integral in logistics and supply chain management (SCM), the number of warehouse infrastructures have steadily increased over the years and such circumstance has tremendously impacted the environment [10]. Moreover, similar with commercial and residential buildings, warehouse infrastructures must also embrace a sustainability concept [9]. The parallel approach to implement sustainable concept is required because, like other infrastructures, warehouse infrastructures generate pollutions too.

Despite the growing interest on GWP among academicians and practitioners, the GWP literature are still limited and terse. For example, past studies focus more on the factors affecting green logistics and supply chain [11], [12] and sustainable warehouse modelling [3], [13], [14] whilst overlooking the significance of green warehousing.

Research on the antecedent of GWP is lacking and understanding remains scarce. Hence, there is a need to expand the knowledge and understanding of GWP, in particular, one that addresses the possible antecedents that influence GWP implementation.

Therefore, the purpose of this paper is to develop a theoretical framework to enhance better understand on the antecedents of GWP. This paper attempts to determine the internal and external antecedents towards GWP. Two prominent management concepts of stakeholder and institutional theories set the foundation of the theoretical framework. This paper could potentially provide valuable insights of GWP antecedents to both logistics and warehouse operators and policy makers to further reap the benefits of greener logistical approach and channel stakeholders' attention towards the need and importance of green warehousing practices.

This paper contains four parts. Firstly, it reviews the extant literature relevant to green warehousing. Secondly, the internal and external antecedents to GWP is reviewed. Then, in the third section, the theoretical framework is developed and several research propositions are discussed. Lastly, the paper concludes with research contributions and several recommendations for future research directions.

## 2. Green Warehousing

Green warehousing is one of the concepts from green logistics knowledge branch. In recent years, as an effort to minimize logistics ecological impacts, there is a large and growing body of literature on green logistics practices [11], [12]. Thus, green warehouse plays a crucial part in shifting from the environmentally-degrading conventional approach to the more of environmentally-friendly way of logistics management.

Due to the increasing pressure of minimizing costs as well as lowering logistics carbon footprints, logistics service providers (LSP) are more concern and dedicated on improving warehousing operations and functions. This is understandable because warehousing infrastructures and functions are among the critical activities of logistics system behind transportation. Hence, the environmental impact induced by warehousing operations has become more significant than even. For instance, the World Economic Forum in 2016 emphasized the role of warehouse operations emission reduction and its

importance towards a more sustainable logistics operation. Furthermore, the 2015-2020 Logistics and Trade Facilitation Master Plan has identified warehouse as an integral element in logistics activities. The plan further accentuates raising need to improve the overall warehousing standards as it could potentially increase the efficiency of cargo distribution.

Moreover, because logistics play a vital role in import and export activities, the Third Industrial Master Plan 2006-2020 identified warehousing operations as one of the key aspects and functions in SCM (Third Industrial Master Plan 2006-2020, 2006). However, warehouse operations have adverse effects towards the environment which ultimately jeopardizing sustainable business. Therefore, the concept of GWP is regarded as a measure to overcome the issues and committed in reducing carbon emissions globally.

Data generated from the 2014 Intergovernmental Panel on Climate Change (IPCC) reported that 27 percent of the global greenhouse gases (GHG) emissions is emitted from industrial buildings, including warehousing and storage infrastructures. This further heightens the significance of GWP on a global scale. By conducting a 'greener' warehousing operations, it could potentially reduce air-borne pollution. Ultimately, the GWP approach is not entirely to reduce carbon emission *per se*, it could also have economic and societal benefits both on the micro and macro level. Therefore, it is imperative that the present paper studies the antecedents of GWP.

## 3. Antecedents of Green Warehouse Practices

Stakeholders heavily influence the green practices. Past research categorized stakeholders into two categories; the internal and external stakeholders [11], [15], [16], [17]. Internal stakeholder represents the underlying individual or groups that influence organisational decision in implementing green practices. Internal stakeholders could influence the performance of any organization. On the other hand, external stakeholders are group of people that are not part of an organization, but represent the outside parties that affect the organisation's business conducts. In the case of GWP, green practices are not solely reliant on internal stakeholders, but could also influenced by external stakeholders. For example, an organization that faces greater internal

or external stakeholder pressures have greater tendency to adopt green practices. Hence, multiple antecedents, either or both internal and external antecedents could potentially influence GWP. The internal and external to GWP are discussed more in-depth in the next section.

### 3.1. *Internal Antecedents*

#### 3.1.1. *Employee Involvement*

Employees are workers that involve with the daily productions and operations within an organization. Within an organization, every employee is required to practice green approach and cleaner production, parallel with the objective of a greener working environment within the organization. Presently, a 'greener' approach is a necessity and it has become a current working trend in organisation that promote greener environment.

A greener approach could potentially enhance an employee's health state and eventually could further instigate the GWP motivation and eventually leads to company's profit. Organisations nowadays are not only concern in profit *per se*, but are concurrently caring for the employees' goodwill and job satisfaction towards better culture and group-oriented teamwork [15]. Therefore, satisfaction among the employees should be fulfilled in order to encourage and motivate greener practices, particularly the GWP as an employee's involvement will encourage an organisation to implement green practices.

#### 3.1.2. *Top Management Commitment*

Top management is responsible for the administration of an organization and is considered the driving force towards GWP. The traits of positive attitudes, clear visions, authoritative leaderships, precise strategic intents and profoundly committed are mandatory for top managerial personnel to implement GWP. Admittedly, organizational support from higher hierarchy is necessary and essential in adopting GWP. This group of high-ranked managerial personnel has pledged to allocate and provide the required resources, both monetary and non-monetary, efficiently towards GWP. Such undertaking is needed to ensure sustainable competitive advantage.

It is widely accepted that sufficient organizational resources and adequate learning capabilities may

influence the success GWP implementation. For instance, training and development are among the fundamental intensive from the top management in developing employees' skills whilst encouraging them to practice GWP. Hence, top managerial commitment, through employees' execution, it could somehow generate higher innovative capacities and eventually advances GWP implementation [11].

#### 3.1.3. *Owner Support*

Owner or shareholders are the individuals who own and hold a significant share of interest within an organisation. This group of people is regarded as the 'silent' stakeholder. Nevertheless, they are regarded as the key figure who strategize the organization's future direction and strategy undertakings. The role and support from an owner portrays positive attitudes towards environmental concern and somehow reflects the direction of an organisation's commitment to perform better within the current competitive business environment [18]. Without full support and commitment from an organisation's owner, the GWP could not be successfully implemented.

### 3.2. *External Antecedents*

#### 3.2.1. *Governmental Pressure*

Government is the main body that governs and controls the organisations towards adopting a GWP through stipulated rules, regulations, guidelines and policies. Through imposing tax, subsidies, import/export duty exemptions, financial incentives, assisted project developments, training programs and the availability of external resources could potentially influence the GWP adoption. These initiative would cause a behavioural shift towards greener practice, for example waste reduction, carbon emissions reduction and the promotion of renewable energy application [19]. As government is regarded as an institutional body that regulates the logistics industry, its role to improve and enforce greener and cleaner approach, through appropriate regulations, will bring positive changes at a much higher level (i.e. national level).

A pressure from the governmental enforcement would become the main reason for organisations commitment moving towards the green practices, in this case the GWP. This is because a nation's development in green and cleaner environment is highly influenced by the governmental institutions.

Hence, the absence or weak legislative instruments for sustainable green environment development among the most developing and developed countries is negatively affecting GWP implementation.

### 3.2.2. Industry Competition

An industry competition is defined as a healthy rivalry counterparts who compete within similar markets while operating with similar resources. In order for an organisation to gain competitive advantages, green practices is one of the great tools to win over the competitor [20]. In this case, technology innovations, which includes the Internet of Things (IoT) application in GWP is the strategy that has led to the sustainability of companies like Amazon and the DHL [21]. This is because larger and more successful organisations have the propensity to face a much tighter and more intense competitions from their respective competitors within similar business and industry.

The environmental pressure has motivated organisations to self-regulate and become proactive. Evaluating and analysing potential competitors are of utmost importance along with the need to continuously innovate and introducing newer initiatives or alternatives towards best green practices. Thus, by undertaking a proactive green practices approach and the implementing GWP, organisations can address current and ever evolving environmental challenges.

### 3.2.3. Customer Demand

In the current modern and globalized world, customers (both B2B and B2C) prefer greener and sustainable products or services. According to a study in 2013, more than 75 percent of customers are demanding for a greener product and services as they are dedicated to protect and live in better environment [8]. Furthermore, customer demands and feedbacks has become ever more significant form of external pressure [22]. Take Malaysia for example, a pro-environmental behaviour plays a vital role in promoting green practices. The awareness towards green practices are growing among the Malaysian LSPs. This is because, apart from the preference on greener products and services, customers are also expecting a green and sustainable practices as a standard for any products or services. A reason behind this matter is because customers are becoming more knowledgeable and aware and thus started questioning whether the

products or services that they buy could affect the environment and *vice versa*. Thus, customers demand would influence the organisations decision towards GWP.

## 4. Theoretical Framework and Propositions

To investigate the internal and external antecedents of GWP, two established strategic management theories; the Stakeholder Theory (ST) [16] and Institutional Theory (IT), are integrated to develop a more meaningful theoretical framework and research propositions. We argue that an organization needs support from various stakeholders to survive and remain competitive. Hence, this study attempts to integrate the aforementioned theories in obtaining a more comprehensive understanding of GWP antecedents.

Over the last three decades, ST has received much attention and widely introduced as a theory in explaining the common antecedents for adopt of various environmental practices, including the GWP. ST concerns on groups or individuals affected or involved in practices, implementation, achievement, decisions or future direction of an organisation [16]. Stakeholders must formulate and implement processes that can guarantees a long-term success of the organisation [16]. Stakeholders can be classified into two; internal and external stakeholders [15]. Hence, in view of GWP, it definitely requires the commitment and connection both internal and external stakeholders.

Internal stakeholders is the primary assets of an organisation. This set of stakeholder refers to the individuals or groups within an organization and are collectively responsible to sustain business operations. As such, it involves the likes of employee, top management, owner or shareholder [23]. Separately, the ST consists of three approaches, namely descriptive, instrumental and normative [24]. Firstly, a descriptive approach is a process to produce a satisfactory outcomes by venturing into a broad set of interests within a balanced path. Secondly, an instrumental approach is a strategic undertaking where stakeholders become the engine to propel organisational goals. Thirdly, a normative approach addresses moral and ethical concerns for organisations and stakeholders to achieve a balanced of legitimate interest. Among the three approaches, the ST focuses more on the

normative approach. Through normative approach, it focuses on the management decision which the organization and managers play a role to recognize and act on various stakeholders' interests in a broader society, and as such, owe a moral duty [16]. Meanwhile, an external stakeholders is a secondary group that is not part of an organisation but represents the external parties. This set of group affects an organisation's business activities. The adoption of GWP does not rely solely on the internal stakeholder because it is also influenced by the external stakeholder. Different stakeholder groups have different influences and views towards the GWP. Traditionally, the ST focuses on the management decision but nonetheless, the external stakeholders entail more on the management choices in shaping and attaining economic efficiency. It provides a ground rule on how an organisation should respond to the institutional pressures within its respective environments.

Moving on to the IT. Established by DiMaggio and Powell [17], the IT encompasses the organizational actions and commitments undertaken aimed at reacting to pressures and expectations from external environments. In short, it is intended to gain market recognition, support, and legitimacy [25], [26]. The IT is rooted on the notion that human action is extremely important within the institutional contexts. This theory exists because of organisation operations are heavily bound by rules, regulations, and policies. Thus, this theory supports the theoretical framework of GWP. The present study argues that three antecedents commonly stimulate GWP are governmental pressure, industry competition, and customer demand. Therefore, this paper provides additional insights on how the external stakeholder interests might influence GWP.

The IT posits that the coercive, normative, and mimetic isomorphism positively influence an organisation's competitive environmental alignment [16]. Firstly, a coercive isomorphism can be divided into two categories, namely regulation (formal) and competition (informal). A regulation-type coercive isomorphism refers to governmental factors that significantly relate to standards for GWP and its certification. At an individual level, the competitive pressure (informal) can be defined as another key constituents in the coercive isomorphism. Individuals at an organisational level may adopt pro-environmental behaviour from the regulatory enforcement to gain the competitive advantage [28].

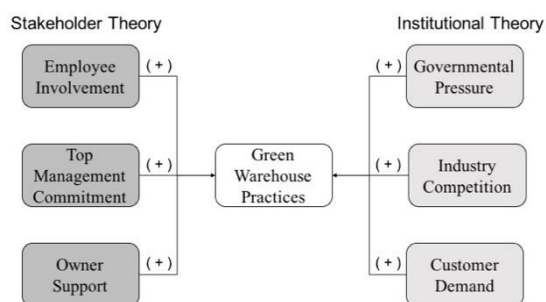
Developing countries, like Malaysia for example, coercive pressure is an important factor that drives the organization to adopt GWP. It is understood as government plays an important role that could influence the implementation of GWP. Along with the increasing environmental concerns, the Malaysian government has established green initiatives, most notably is the Green Building Index [15].

Secondly, normative isomorphism pertaining to individual assumptions and expectations. The IT posits that the increasing individual environmental awareness from the internal and external organisation forms the core normative pressure to implement green practices [27]. Situation arrives when leading organisations committed by the first-mover towards the green practices implementation. In the context of GWP, normative isomorphism indicates that organisations comply with societal norms or being sensitive to a customer demand towards green practices without disregards the standards and legislation will eventually secure and win the battle [28]. Such undertaking is a professional gratitude where an organisation signifies the pressure to conform to industrial norms and societal expectations.

Thirdly, mimetic isomorphism is driven by environmental uncertainty. Business organisations voluntarily commit or replicate competitors' best practices with the aim to survive and remain competitive in the industry [29]. By mimicking approach, an organisation could reduce costs with minimal efforts while avoiding the first-mover risks. Industry competition leads to a benchmarking in the context of GWP. In the field of green practices, researchers have adopted the IT, including the green SCM practices [30]. However, because of the lack of study on the coercive, normative, and mimetic isomorphism of GWP, this study intends to experiment the relationship of IT towards GWP.

On this basis, the discussed theoretical argument attempted in this study expresses the role of stakeholders in empowering GWP. Through developed GWP framework, it provides an overview of multiple stakeholder in highlighting the GWP implementation and draws the attention from both the stakeholder and institutional theories. The theoretical framework in Figure 1 proposes how various stakeholder interest plays important roles towards GWP. It also contributes to a greater

understanding on various stakeholder impacts towards organizational decision. The Figure 1 below illustrates the possible contribution towards GWP.



**Figure 1:** Proposed Theoretical Framework

Tentatively, based on the theoretical framework, the following six propositions are proposed:

- Employee involvement has a significant positive effect on GWP.
- Top management commitment has a significant positive effect on GWP.
- Owner support has a significant positive effect on GWP.
- Government pressure has a significant positive effect on GWP.
- Industry competition has a significant positive effect on GWP.
- Customer demand has a significant positive effect on GWP

## 5. Conclusion

The present study is designed to develop a theoretical framework that ascertains the antecedents of GWP. Although past studies focused on green logistics and SCM, the element of warehousing are less researched even though it is an imperative function in logistics and SCM. Through the conceptual lens of ST and IT, this paper identifies the theoretical gap and bridge the uneven scope of research by exploring the antecedents of GWP. Thus, the application of ST and IT set the foundation of the proposed theoretical framework.

The synthesis in this paper extends the GWP knowledge and contribute to the existing green logistics and SCM body of literature. It further emphasizes the relevant of the stakeholder and institutional approaches in GWP research. This study also serves as a basis for future studies and attracts more academic arguments to further fine-tune and explore the suggested propositions. As this paper applies a theoretical perspective, future direction is to carry out comprehensive literature reviews and validate the concept through case studies or empirical research. More research needs to be done to validate and reinforce the proposed

theoretical framework. Therefore, future research should concentrate on both qualitative and quantitative research designs by examining the relationship between the antecedents and GWP factors. Ideally, insights from practitioners and academicians are highly encouraged in substantiating the proposed theoretical framework.

## References

- [1] Fichtinger, J., Ries, J. M., Grosse, E. H., Baker, P., *Assessing the environmental impact of integrated inventory and warehouse management*, Int. J. Prod. Econ., 170, pp. 717–729, 2015.
- [2] Singh, A., and Trivedi, A., *Sustainable green supply chain management: trends and current Practices*, Competitiveness Review, 26 (3), pp. 265 – 288, 2016.
- [3] Tan, J. X., *LEED certification in China*, CIOB-Contact China, No. 9, pp. 19-20, 2010.
- [4] Baker, P. and Canessa, M., *Warehouse design: A structured approach*, European Journal of Operational Research, 193 (2) pp. 425-436, 2009.
- [5] Lee S. Y., *Drivers for the participation of small and medium-sized suppliers in green supply chain initiatives*, Supply Chain Management: An International Journal, 13 (3), pp. 185-198, 2008.
- [6] Samari, M., Godrati, N., R., Olfat, P., & Shafie M.W.M., *The investigation on the Barriers in developing green building in Malaysia*, Modern Applied Science, 7 (2), 2013.
- [7] Green Building Index, <http://new.greenbuildingindex.org/>, 16-Oct-2017.
- [8] Laosirihongthong, T., Adebajo, D. and Tan, K.C., *Green supply chain management practices and performance*, Industrial Management & Data Systems, 113 (8), pp. 1088-1109, 2013.
- [9] Roy, M., *Green Warehouse*, ASHRAE Journal, pp. 64-70, 2010.
- [10] Davarzani, H. & Norrman, A., *Toward a relevant agenda for warehousing research: literature review and practitioners' input*, Logistics Research, 8 (1), pp. 1-18, 2015.
- [11] Green, K.W., Zelbst, P.J., Meacham, J. and Bhaduria, V.S., *Green supply chain management practices: impact on performance*, Supply Chain Management: An International Journal, 17 (3), pp. 290-305, 2012.
- [12] McKinnon, A., Cullinane, S. Browne, M. & Whiteing, A., *Improving environmental sustainability of logistics*. Kogan Page Limited, London, 2010.
- [13] Kah-Shien T., K. S., Ahmed, M. D. & Sundaram D., *Sustainable enterprise modelling and simulation in a warehousing context*,

- Business Process Management Journal, 16 (5), 871 – 886, 2010.
- [14] Amjed, T. W., & Harrison, N. J., *A Model for sustainable warehousing: from theory to best practices*, International Decision Science Institute Conference, Decision Sciences Institute, United States pp. 1892-1919, 2013.
- [15] Clark, J.W., Toms, L.C. and Green, K.W., *Market-oriented sustainability: moderating impact of stakeholder involvement*, Industrial Management & Data Systems, 114 (1), pp. 21-36, 2014.
- [16] Freeman, R.E., *Strategic Management: A Stakeholder Approach*, Pitman, Boston, MA, 1984.
- [17] DiMaggio, P.L. and Powell, W.W., *The iron cage revisited: institutional isomorphism and collective rationality in organizational fields*, American Sociological Review, 48, pp. 147-160, 1983.
- [18] Weng, M. H. and Lin, C. Y., *Determinants of green innovation adoption for small and medium-size enterprises (SMES)*, African Journal of Business Management. 5 (22), pp. 9154-9163, 2011.
- [19] Zainul Abidin, N. and Powmya A., *Green Construction in Oman: Progress and Implementation Barriers*, Sustainable Building Conference, Dubai, UAE, 8-9 Dec, 2014
- [20] Dowlatshahi, S., *A framework for the role of warehousing in reverse logistics*, International Journal of Production Research, 50 (5), pp. 1265-1277, 2012.
- [21] Supply Chain Digital. <http://www.supplychaindigital.com/>, 10-Feb-2017.
- [22] Solakivi, T., *The Connection between Supply Chain Practices and Firm Performance – Evidence from Multiple Surveys and Financial Reporting Data*, Master's Thesis, University of Turku, pp. 1-76. 2014.
- [23] Meixell M. J. and Luoma P., *Stakeholder pressure in sustainable supply chain management: A systematic review*, International Journal of Physical Distribution & Logistics Management, 45 (1/2), pp.69-89, 2015.
- [24] Donaldson, T. and Preston, L.E., *The stakeholder theory of the corporation: concepts, evidence and implications*, The Academy of Management Review, 20, pp. 65-91, 1995.
- [25] Meyer J. W. and Rowan B., *Institutionalized organizations: formal structure as myth and ceremony*, American Journal of Sociology, 83 (2), pp. 340-363, 1977.
- [26] Rowley T., *Moving beyond dyadic ties: a network theory of stakeholder influences*, Academy of Management Review, 22 (4), pp. 887-910, 1997.
- [27] Kalamas, M., Cleveland, M., & Laroche, M., *Pro-environmental behaviors for thee but not for me: Green giants, green Gods, and external environmental locus of control*, Journal of Business Research, pp. 1–10, 2013.
- [28] Huang Y. C. and Yang M. L., *Reverse logistics innovation, institutional pressures and performance*, Management Research Review, 37 (7), pp.615-641, 2014.
- [29] Talib M. S. A, Sawari S. S. M, Abdul Hamid A. B. and Chin T. A., *Emerging Halal food market: an Institutional Theory of Halal certificate implementation*, Management Research Review, 39 (9), pp. 987 – 997, 2016.
- [30] Zhu Q., Sarkis J. and Lai K. H., *Examining the effects of green supply chain management practices and their mediations on performance improvements*, International journal of Production Research, 50 (5), pp. 1377-1394, 2012.