Knowledge Management And Green Technology Adoption In Transportation Industry: An Approach Towards The Environmental Sustainability In Malaysia

Maryam Kalhoro 1,2*, Hui Nee Au Yong1, Charles Ramendran SPR1, Noor-Un Nisa Shahani3, Abdelhak Senadjki1

1Faculty of Business and Finance, Universiti Tunku Abdul Rahman, Kampar, Perak, Malaysia.
2Department of Business Administration, University of Sindh, Pakistan.
3Bath Spa University, Academic Center Ras Al-Khaimah-UAE.

Abstract: As transportation, storage, production, and consumption of products and services have increased due to globalization, environmental issues have arisen. In the logistics systems of enterprises and the global market, transportation services and infrastructure play a critical role. As transportation and logistics systems become more integrated, their impact on the physical environment becomes a key concern. To implement innovative green transportation that promotes environmental sustainability, the current study recommends the role of knowledge management in the transportation industry. The research paper proponents for green transportation in the transportation businesses and integrates environmental concerns into Malaysia's logistics management. The study discovered that applying information that boosts knowledge production, knowledge acquisition, knowledge sharing, and knowledge management improves the knowledge management and green technology adoption.

Keywords: Knowledge Management; Green Technology Adoption; Transportation Industry; Environmental Sustainability

1. Introduction

Transportation is considered one of the major elements for economic development, whether provided for public mobility management or goods through different modes, i.e., road, rail, air, and ocean. All these means of transportation are equally functional and are equally important across the globe. The core concern is how to make it compatible with our environment (Faulin et al., 2019). Malaysia is undergoing fast industrial and economic development and several major environmental issues. Air pollution, energy waste, and water contamination are among these issues. On the other hand, air pollution is a huge issue that affects human health, crops, forest species, and ecosystems (De Marco et al., 2019). Malaysian firms perceive green technology
innovation as a possible idea for sustainable growth to keep their products and services ecologically friendly to address these concerns. Its goal is to eliminate carbon emissions by 2030 with self-driving cars and other green programmers. To achieve goals for long-term sustainable development in every sector, the SDGs recognize the importance of environmental management and economic development. Large transport vehicles’ enormous contribution to air pollution and other air or airborne contaminants, rising CO2 emissions, and accelerated global warming have all become serious issues (Sadatshojaie and Rahimpour, 2020).

Compared to power stations and the industrial sector, the Malaysian transport industry produces the most CO2 (98%) and NOx (67%) as well as lorries and vans (Shafie and Mahmud, 2020). The current traditional logistics system has a severe negative impact on our environment worldwide. All the means of logistics such as logistics by roads, rails, air, and oceans are highly dependent on the non-renewable resources of energy; therefore, the percentage of carbon dioxide and other hazardous gases are increasing day by day, causing a temperature rise. The passenger's transportation contribution to CO2, i.e., emission by train is: 28.39 g of CO2 / km whereas from the car is 101.61 g of CO2 / km. Aeroplane emission: 244.09 g of CO2 / km. The freight the lowest contribution to the emission of CO2 is by train, i.e., 15.6 g of CO2 / km, from ships the emission is about 50.62 g of CO2 / km whereas more contribution is from the truck and other lorries used for logistic is with the 139.8 g of CO2 / km. Therefore, the implementation of green technological approaches is highly in need to minimize the use of fossils fuels once the concept of green transportation not only for passengers but also for logistics (Teixeira et al., 2018). Consequently, environmental concerns have made companies more aware of the need for innovation.

Although research is conducted on environmental challenges in the transportation industry, it will need to be increased throughout time to solve important environmental issues (Costin et al., 2018). Most of the literature is written from the standpoint of industrialized countries, such as the United States, Europe, China, and Japan. Green innovation has been studied in rising economies such as Malaysia. Green Innovation methods mature in developed, developed, and developing economies and apply to developing countries. Furthermore, there is little or no research on the decision-making powers of adopting green technology innovation.

Similarly, prior environmental studies have not conducted a practical study of knowledge management elements and their consequences on environmental sustainability, even though green technology was later embraced. The concept is particularly underappreciated in the logistics and other transportation industries; as a result, the current study addresses this issue. Understanding the decisive criteria is necessary for adopting green technology innovation in transportation industries. This adoption will help both individual businesses and the community. Accordingly, dynamic companies adopt several proven strategies to improve organizational performance to meet market needs and achieve environmental sustainability goals, such as Knowledge Management and Green Technology Innovation. Knowledge is an intangible asset that determines whether a company succeeds or fails (Abbas and Sagsan, 2019). Knowledge management allows every company to be competitive right now to increase the satisfaction of every shareholder (Travern,
Effective knowledge management allows the organization to be more innovative and manage operational processes (Shahzad et al., 2020). Due to the depletion of natural resources and the increase in global warming, companies have had to experience significant levels of pressure from the community (Takalo & Tooranloo, 2021) to abandon and adopt practices that cause environmental problems from other stakeholders.

According to Allam and Dhunny (2019), there are three sustainable development indicators: environmental, social, and economic. Environmental sustainability focuses on the natural environment and resources. At the same time, social stability is concerned with society and people, and economic stability is concerned with organizations’ economic and financial aspects (Ikram et al., 2019). Furthermore, green technology innovation is a concept aimed at assisting enterprises in achieving sustainable development goals and developing environmentally friendly products (Zhou et al., 2020). Businesses must address technical and administrative improvements to achieve this (Cai and Li, 2018). Green Technology innovation aims to combine environmental understanding with technological advancements. Businesses can improve new or existing goods or processes with green technology innovation, allowing them to conserve raw materials, energy, and resources while also developing harmony between the environment, the economy, and industrial processes (Meidute-Kavaliauskiene et al., 2021). Green management technology, on the other hand, involves reorganizing or adopting new management methods by logistics organizations and other transportation industries to improve management and production processes by eliminating or limiting negative environmental impacts (Kwak et al., 2018).

Although many scholars have researched knowledge management and sustainable environmental development from various viewpoints, little emphasis has been paid to the function of knowledge management in attaining sustainable development, especially with the help of green technology Innovation (Lim et al., 2017). Mardani et al. (2018) and Davenport et al. (2018) stated that the little literature on knowledge management, green technology adoption, and environmental sustainability must be improved.

Given the preceding discussion, the current research will address the following questions: What role do knowledge management and other determinants (knowledge creation, knowledge acquisition, knowledge sharing, and knowledge acquisition) play in promoting innovative green transportation in the industry? Furthermore, how does the industry's adoption of green transportation affect the environment's long-term viability?

For research on reaching their sustainable development goals, this study adds to the empirical literature on the relationship between green information management and green technology adoption, specifically in the transportation industry.

2. Underlying Theories
The concepts of 'Knowledge Management Theory' and 'Sustainability Theory' as the foundation for this study.
2.1 Knowledge Management Theory

According to Bolisani et al. (2020), knowledge is an abstract concept of emancipation from the direct reality that comes in two varieties: explicit and tacit knowledge. Explicit knowledge is unambiguous knowledge that can be formalised, transferred, and expressed. Clear knowledge is written down in reports, publications, and manuals (Boadu et al., 2018). The tacit is the unspoken. Turner (2018) defines knowledge as "the hidden and unwritten knowledge in people's minds" obtained through experience and social interaction. Tan (silent) knowledge is more difficult to communicate to others than clear knowledge because it is unwritten (Syrjä, 2019). Yang (2008) defined cognitive management as the management of both explicit (clear) and implicit (silent) forms of knowledge.

2.2 Theory of Sustainable Development

The Bruntland Commission Report provided the United Nations General Assembly with the Principle of Sustainable Development 1987 (UN, 1987) under "Our Common Future." The paper focuses on economic development and environmental sustainability challenges. According to the paper, sustainable development is "development that meets the demands of the current generation without jeopardizing future generations' ability to satisfy their own needs." Munasingh added a third strategy to sustainable development in 1992, namely social stability (Munasingh, 1993). As a result, sustainable development is defined as achieving economic, social, and environmental sustainability by incorporating all viewpoints in decision-making. Environmental development concepts are linked to the Green Theory, a modern and multidisciplinary approach that says that businesses should focus on using green management strategies and advanced technology to develop environmentally friendly products and services. The Environmental Policy for Sustainable Development provides environmental protection, clean water and air, the depletion of natural resources (particularly renewable energy), the manufacture of ecologically friendly products and the decrease of hazardous gas and liquid emissions (Olabi et al., 2022).

3. Literature Review and Proposition Development

Green transportation has a broader application in the movement of people and commodities since it improves air quality and reduces noise pollution (McKinnon, 2018). Making large contributions to global warming raises the chance of serious car accidents (Jamal et al., 2020). According to Sada (2020), transportation accounted for 14% of global greenhouse gas emissions in 2000, which has risen in successive years. On the other hand, Freight traffic surged considerably as e-commerce and client demand grew. Green Transportation has resulted in a strategic distribution of activities that provide smart solutions to firms' low carbon footprint, which has strained total expenses and personal life (Linstadt et al., 2020; Shaharudin et al., 2018; Sureeyatanapas et al., 2018; Pan et al., 2021). Putting green technology innovation into practice necessitates significant human resources (Shamout et al., 2022). Employee participation and the growth and development of their recognized skills are critical to success. The elements that influence the adoption of green technology innovation in Malaysian transportation services are examined in this study. Personal,
organizational, and contextual factors, according to some academics, may impact the acceptance of technological advancements (Lin et al., 2021). As a result, the focus of this research is on environmental development in knowledge.

### 3.1 Knowledge Management and Environmental Sustainability

The process by which businesses guarantee that their employees get the correct information in the right format at the right time is known as knowledge management (Abbas, 2020). Knowledge management can be divided into two categories (Abubaker et al., 2019): Management of people and information are two different things. The subject of public management is linked to creative capability and skill knowledge. On the other hand, information management is linked to clear knowledge and aids firms in being more competitive and creative. Knowledge management and environmental sustainability are critical in a science-based society. Knowledge is the main driving factor for personal, organizational, and national growth, according to Azahidi et al. (2020). Organizations that base their actions on science are more likely to be innovative and explore new sustainability directions (Le and Lei, 2018).

The United Nations has asked for all firms, particularly those in the manufacturing sector, to embrace the Global Compact (UNGC, 2018) environmentally friendly procedures and resources (Brown et al., 2018) to combat the detrimental impact of corporate operations on the natural environment. Requested to be equipped with cutting-edge technologies. The basic mechanisms that allow corporations to produce new technologies are knowledge sharing and research and development efforts (Habib et al., 2019). From an economic and environmental standpoint, dynamic companies use such technology to improve the company's performance, new or existing goods, and operations (Cesarino et al., 2019).

The proposed assumption formulated are as follows:

**Proposition 1:** Knowledge creation, knowledge acquisition, knowledge sharing, and interpretation are crucial to knowledge management.

#### 3.1.1 Knowledge Creation

According to (Salah and Gobet, 2019), cognitive production results from individuals and interactions comprehending and learning. Organizations must devote sufficient resources to the creation of new knowledge. Building knowledge improves their ability to innovate and develop new technologies (Habib et al., 2019), thus assisting in achieving sustainable goals. Knowledge-intensive companies strive to use resources efficiently and implement environmentally friendly practices (Albort-Morant et al., 2018). Such organizations promote and facilitate the development of green products while also considering the environmental impact of their efforts.

Therefore, the following hypotheses can be proposed:

**Proposition 1 (a):** Knowledge creation is associated with knowledge management.
3.1.2 Acquisition of knowledge

Organizational tasks such as gaining, gathering, and retaining knowledge from multiple sources are called knowledge acquisition (Atiya, 2018). Most employees learn from internal sources such as coworkers and team members (Marjanovi and Kriman Pavlovi, 2018). Employees who acquire knowledge are more likely to get to know one another and boost productivity (Wang et al., 2019). As a result, a company's ability to acquire and absorb knowledge positively impacts its bottom line (Shahzad et al., 2019). Therefore, the following proposal has been developed:

Proposition 1 (b): Knowledge acquisition is associated with knowledge management.

3.1.3 Knowledge Sharing

The supply of explicit or silent knowledge to an individual or group is known as knowledge sharing (Nguyen, 2020). It is an important tool for social interaction in organizations, according to Attia and Salama (2018), because it allows workers to handle difficulties constructively. It is good assistance for strategy making, decision making, and learning environment, according to Anagun (2018). Understanding sharing increases operational and financial stability by increasing workers' clear and intelligent knowledge, reducing errors and mistakes, and reducing errors and mistakes (Borges et al., 2018). Learning organizations strengthen their internal and external environmental sustainability to support joint creativity and a win-win culture. Developed proposition is:

Proposition 1 (c): Knowledge sharing is associated with knowledge management.

3.1.4 Knowledge Applications

In designing or delivering products and services, knowledge application applies or consolidates previously learned knowledge (Jugstadt & Person, 2020). It is also defined as a company's ability to influence the design of new products and services in response to operational changes through technology and strategy (Tura et al., 2019). Companies find new methods that can greatly increase their performance by applying knowledge. Dynamic organizations adhere to environmentally friendly practices and combine existing and new information into research and development operations to introduce new processes and technologies in the interests of shareholders (Albort-Morant et al., 2018). Therefore, proposition constructed is:

Proposition 1 (d): Knowledge application is associated with knowledge management.

Knowledge management is largely responsible for producing and sustainably utilizing knowledge resources, taking social, environmental, and economic considerations (Shahzad et al., 2018). An adaptive to change and learning companies focuses on merging knowledge management systems with comprehensive organizational tactics (Akhavan and Philsoophian, 2018). As a result, the ability of firms to absorb knowledge has a substantial impact on environmental performance (Shahzad et al., 2020). Although many researchers have highlighted the importance of Knowledge Management in general innovation and firm performance (Martins et al., 2019; Soto-Acosta et al.,
2018; Bashir and Farooq, 2019), little attention has been paid to the role of knowledge management and environmental sustainability. As a result, the study's main proposition is:

Proposition 2: Knowledge management is significantly associated with environmental sustainability.

3.2 Green Technology Adoption and Environmental Sustainability

Green technology adoption by businesses is a method for reducing or eliminating the negative environmental impact of their operations (Syafri et al., 2021). Green technologies are used in the transportation industry to foster innovation in products, processes, technology, and management structures to safeguard the environment (Khan et al., 2021).

The Green Innovation Process strives to improve industrial processes (Albort-Morant et al., 2018). Decreasing natural resources, employing renewable resources, and reducing waste are examples of such reforms (Huang et al., 2019). Companies that adopt such measures will be able to benefit economically while also reducing ecologically dangerous activities (Sangha et al., 2019). Environmental management policies and procedures can help businesses meet their financial objectives.

Knowledge management serves as the foundation for research and analysis (Habib et al., 2019). Many executives believe that innovation initiatives buffer organizational social stability and performance (Guerrero-Villegas et al., 2018). The use of limited natural resources in goods and services promotes environmental sustainability. Following are some hypotheses based on the preceding debates on knowledge management, green technology adoption, and environmental sustainability:

Proposition 3: The adoption of green technology in the transportation industry mediates the relationship between knowledge management and environmental sustainability.

Based on the recent supporting literature the following proposed framework is constructed on knowledge management, green transportation adoption and environmental sustainability.
4. **Proposed Research Method**

Each research project needs the right approach to conduct the research, which needs to be more practical, objective-focused, and easier to understand. We will proceed with a systematic literature review based on secondary data qualitative study. Various sources collect relevant data, such as highly relevant websites, journals, and books. In line with the proposed research approach to future research, this study will adopt a cross-sectional study based on basic research. The data will be collected from Malaysia's transportation industries' supply chain management companies. This study involves conveying a positive message about the green transportation approach's stability in Malaysia's transportation industries.

5. **Discussion and Theoretical Implications**

The current study focuses on the interaction between knowledge management, green technology uptake, and environmental sustainability from a multidisciplinary perspective.

According to empirical investigations, knowledge management has a considerable positive impact on environmental sustainability (Abbas, 2020). Their leadership in Malaysia's transportation industry indicates a strong commitment to improving knowledge management and operations with their personnel to achieve environmental sustainability goals.

The impact of knowledge management and environmental sustainability has been mitigated by adopting the industry's green technology. Through collaboration, workers can gain access to external information needed for extensive research and development operations. They can apply what they have learned from their peers to design ecologically friendly technology. This finding demonstrates that questioned businesses see knowledge acquisition to achieve financial stability while also increasing the quality of their products and services. These organizations put their
accumulated knowledge to good use in social development activities. However, there is a strong relationship between cognitive development and social stability.

According to Shahzad et al. (2019), most of the companies surveyed did not devote enough time and effort to enhancing their social contributions and learning how to become social leaders. Sharing knowledge has a tremendous positive impact on all aspects of sustainable development. As a result of Habib et al. (2019) information sharing, workers' innovation skills and economic performance will considerably improve. The findings revealed that model companies place a premium on information sharing within and outside their businesses.

Logistics is the most important part of our society. It is required to transport goods, persons, resources, and other goods. Various resources of logistics are in use around the world. These resources include transporting people by buses, cars and planes, trucks, ships, air and rail goods and other natural resources. All these transportation resources are conventional routes. Therefore, it is not an effective and environmentally friendly source. It is now universally true that conventional and fossil fuels are responsible for 95% of greenhouse gas emissions to the environment and 95% of greenhouse gas emissions in the transportation ecosystem.

The whole world is aware of the vulnerability of this problem, and many countries, including Malaysia, have taken many positive steps to bring alternatives to the current transport management system for people and goods. Similarly, waste management also plays an important role in controlling reverse logistics in the country.

The government takes several major steps for a green logistics policy across Malaysia. These include free parking facilities in public places, free charging facilities for electric car owners, no toll gate charges and many more incentives to encourage people to own electric vehicles. These are all positive steps observed during research. The most interesting thing observed throughout the study is that the role of rail transport is the most sustainable source for people and freight. In addition to all the steps mentioned above, thousands of trucks can be seen on the roads every day, which still poses a great threat to the stability of our planet.

Thousands of cars and various petroleum vehicles are still roaming the roads causing huge damage to the environment. Therefore, it is essential that transportation companies first adopt the concept of green logistics to encourage others to do the same.

This research provides useful results on the importance of green technology adoption policies in the transportation industry. It also gives us insight into how traditional logistics systems damage our planet with huge amounts of greenhouse gas emissions. The steps taken by the Malaysian government towards environmentally friendly logistics are highly appreciated, but still, environmental sustainability requires efficiency and impact. Regarding environmental sustainability, rail transport should be used for freight and other long-distance travel. In contrast, we need to use the electric car for our daily transport activities. According to research results, these
two modes of transport are the most efficient and sustainable resources. It is eco-friendly and low cost from a commercial point of view.

Similarly, we need to create awareness among the people through the grass way to make our people aware of the importance of a clean and green environment. The term sustainability is ubiquitous in government and non-government organizations but is not implemented as needed. Therefore, the concerned authorities should implement an environment-friendly policy under all circumstances. Individuals as individuals are equally responsible for that cause.

5. Conclusion

Current research uses the concepts of knowledge management and sustainable development principles from ancestral knowledge management, such as knowledge creation, knowledge sharing, knowledge acquisition and knowledge application, toward adopting green technology in the transportation industry for greater environmental sustainability in Malaysia. According to an empirical literature review, Knowledge Management is needed for Green Innovation in an organization to promote the adoption of Green Technology in the transport industries of Malaysia.

References:

Abbas, J. (2020). Impact of total quality management on corporate sustainability through the mediating effect of knowledge management. Journal of Cleaner Production, 244, 118806.


Boadu, F., Xie, Y., Du, Y. F., & Dwomo-Fokuo, E. (2018). MNEs subsidiary training and development and firm innovative performance: The moderating effects of tacit and explicit knowledge received from headquarters. Sustainability, 10(11), 4208.


sustainable development goals SDGs using novel indicators. Renewable and Sustainable Energy Reviews, 153, 111710.


