

Towards A Sustainable Future: An Analysis Of Sustainable Supply Chain Management Practices Adopted In The Moroccan Context - A Multiple Case Study –

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Abstract

The topic of sustainable supply chain became highly valued by academic and professional communities (Carter and Rogers, 2008; Seuring, 2008; Touboulic, 2014). The realization of the potential risks associated with unsustainable practices in the supply chain has led companies to acknowledge the importance of adopting sustainability measures to manage and mitigate such risks (Carter and Rogers, 2008b; Shibin et al., 2016; Ho et al., 2017).

This exploratory study is conducted with the objective of enhancing our knowledge about the unique sustainability practices that are being implemented by the large companies operating in Morocco. By examining these practices, the study aims to contribute to the theoretical framework of sustainable supply chain management and provide valuable insights into the practical applications of sustainability in the business context. By conducting a comprehensive analysis of the sustainability practices of large firms operating in Morocco this study seeks to identify the benefits and challenges of sustainability practices implementation in the supply chain.

In terms of methodology, we used a multiple case study analysis of three large companies which operate in Morocco. Semi-structured interviews with supply chain managers of the studied companies were the main methods for acquiring data, along with a careful examination of their secondary data.

The objective of this research is to enhance our comprehension of the specific sustainable practices implemented by major companies in Morocco, by developing and presenting a classification system for SSCM practices based on the various supply chain stages. Additionally, this study provides new avenues for research by bringing to light valuable observations on the difficulties and advantages linked with the incorporation of sustainable supply chain management practices in the Moroccan context.

Keywords: Sustainable Supply Chain management (SSCM), Sustainability, Corporate Social Responsibility (CSR), Sustainability Practices.

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I. Introduction

Since our environment is constantly changing, there is an increasing need for understanding of the environmental issues causing these changes. Major storms, resource loss, inflation, and a lack of food and water are just a few of the problems that are causing considerable harm, and affecting the economy and production (Grosvold *et al.*, 2014).

Businesses may experience significant losses and operational disruption as a result of these environmental issues. For instance, the agricultural sector is negatively impacted by climate change, which has a direct impact on people's accessibility and food security. The effects of environmental issues on water supplies can harm agriculture, reduce output, and raise costs.

As a result, and in order to manage and decrease risk, businesses realized how important it was to adopt and integrate sustainability principles into their ongoing activities, particularly their supply chains (Shibin *et al.*, 2016; Ho *et al.*, 2017). In fact, the adoption of sustainability practices assists businesses in reducing the risks associated with their supply chains, by identifying potential risks and pitfalls that might jeopardize and endanger the flow of their supply chains (Touboulic, 2014; Shibin *et al.*, 2016; Ho *et al.*, 2017)..

Researchers started to take an interest in integrating sustainable development into the supply chain in the late 1990s. In fact, before becoming Sustainable Supply Chain Management (SSCM), the subject of sustainability in supply chain management went through a number of stages. One of the first papers that discussed the

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significance of the Green Supply chain, a component of SSCM, was the work of Green et al. (1996). The authors define GSCM as, “the way in which innovations in supply chain management and industrial purchasing may be considered in the context of the environment”.

As a matter of fact, the first definitions of sustainable supply chain management didn't appear until 2008. Carter and Rogers (2008) define SSCM as, " The strategic, transparent integration and achievement of an organization's social, environmental, and economic goals in the systemic coordination of key inter-organizational business processes for improving the long-term economic performance of the individual company and its supply chains”.

According to studies, having a sustainable supply chain management will shield a company from a variety of risks (Carter and Rogers, 2008; Touboulic, 2014; Shibin *et al.*, 2016; Ho *et al.*, 2017).

II. Literature review

The SSCM literature revealed various types of classification of sustainability practices that companies adopt into their supply chains. Environmental purchasing and sustainable packaging are the two categories into which Zailani *et al.* (2012) classify sustainable supply chain management practices. This classification is based on the idea that both purchasing and packaging activities should respect the environment, by cutting down emissions, discharges, releases that can harm and threaten the survival of humanity. Carter and Jennings (2004) refers to the Purchasing Social Responsibility (PSR), which is the involvement of the purchasing function in CSR, as “purchasing activities that meet the ethical and discretionary responsibilities expected by society”.

Golicic and Smith (2013), on the other hand, identify four distinct operationalisations of environmental supply chain practices: design practices, production practices, upstream customer-facing practices, and downstream customer-facing practices. Marshall *et al.*, (2015) suggest conceptualizing supply chain management practices based on market practices, process practices, in addition to social and environmental practices.

Paulraj, Chen and Blome (2017) offered a different classification that includes a company's internal practices, such sustainable product and process design, as well as external practices, including demand-side sustainability and supply-side sustainability collaboration.

Other SSCM researchers decide to narrow their attention to a single part of supply chain. Wolf and Seuring (2010), for instance, argue on the significance of integrating environmental issues as a buying criterion for third-party logistics (3PL) while examining the procurement practices between customers and 3PL.

Besides environmental practices that can be adopted in supply chain, researchers like Pagell and Wu (2009) introduced practices, such as transparency and traceability. While Beske and Seuring (2014), group sustainability practices into five general categories: orientation, continuity, collaboration, risk management and proactivity.

Marshall *et al.*, (2015) stressed out the importance of social sustainability practices in SSCM. Their research classified social practices into two categories: Fundamental (essential) social sustainability practices and advanced (high level social) practices. The first category consists of actions like keeping an eye on suppliers' adherence to health and safety regulations and developing an ethical code of conduct with suppliers. The second group of techniques includes supply chain redesign with an emphasis on worker welfare and fair trade. A socially responsible supply chain needs extra social practices like collaboration and assessment (Sancha *et al.*, 2016).

There are many obstacles that prevent the adoption of sustainability and CSR practices throughout the supply chain, including a lack of awareness of CSR practices, a lack of local enforcement of relevant laws and regulations, and a lack of CSR commitment on the part of businesses and local governments (Chi, 2011). Gopal and Thakkar (2016) list further inhibitors that hinder the adoption of SSCM. These inhibitors include supplier reluctance, cost implications, a lack of government support, a lack of communication, poor human resource quality, a lack of commitment from top management, resistance to technology advancement adoption, and market uncertainty.

III. Research methods

When phenomena are still relatively new to a market, exploratory inquiries can be conducted using case research since it allows for a relatively complete grasp of the nature and complexity of phenomena (Stake, 1995; Seuring and Müller, 2008; Yin, 2009). The case method is a good fit for the research subject at hand as there has been little prior study on SSCM in Moroccan firms. By taking such an exploratory approach, the article hopes to advance theory, particularly with regard to the question of what kinds of sustainability measures Moroccan companies adopt and at what point in the supply chain they are implemented. As a matter of fact, understanding the specifics of the sustainable practices adopted by Moroccan businesses is this paper's main focus, rather than looking for explanation or prediction.

For the purpose of this paper, we decided to use *nonprobability sampling*, a method of selecting participants that isn't based on random sampling. According to Merriam (2009:77), this type of sampling is “based on the assumption that the investigator wants to discover, understand, and gain insight and therefore must select

a sample from which the most can be learned". In fact, knowledge, experience, advanced technology and perspectives brought to the study are the elements taken into consideration when selecting companies as subjects for our study.

This choice enables us to answer our research questions by utilizing a number of data collection and analysis technologies. By comparing the data, we had gathered and employing cross-case analysis and data triangulation, we were able to offer the conclusions more validity and reliability.

As the sustainability practices adopted differ from one company to another, the qualitative methodology we adopted was appropriate for our study questions. this paper doesn't aim to generalize our findings to other companies, as we don't seek a statistical generalization, but rather to draw useful "lessons" not only developed to answer our research questions, but also to assist managers in their decision making.

The data for the study were collected through semi-structured interviews as well as from complementary sources of evidence, such as qualitative documents (internal and external records), published reports and visual materials. We will undertake an analysis of various case studies using a sample of three large companies operating in Morocco (LafargeHolcim Maroc, MANAGEM, and OCP). As our research is already a part of a contextualization logic that considers the interactions that already exist between the context and the phenomenon, the lessons learned will be diverse. The supply chain managers of those large Moroccan companies are the major representation of our objective.

IV. Results

The cross-case analysis revealed various sustainability practices adopted by companies in their supply chains. Those practices are related to the environmental and social aspects.

Environmental practices

The environmental practices implemented by supply chain departments seek to lessen the adverse environmental effects of the businesses' operations and processes through maximizing resource use and lowering carbon emissions.

Error! Reference source not found. presents the environmental practices collected from the cross-case analysis. They can be categorised into eight environmental aspects: Clean energies; Energy efficiency; GHG reduction; Green product or innovation; Recycling; Reduce Fuel Consumption; Resource optimization; and Waste management.

Table 1: List of environmental practices and the sustainability aspect to which they belong.

Environmental	LafargeHolcim Maroc	MANAGEM	OCP
Clean energies	<ul style="list-style-type: none"> The use of green energy (wind and solar energies). 	<ul style="list-style-type: none"> The use of green energy (wind and solar energies). 	<ul style="list-style-type: none"> The use of clean electricity - both cogeneration & renewable.
Energy efficiency	<ul style="list-style-type: none"> Reduce the use of fossil fuels. Reduce energy consumption. 	<ul style="list-style-type: none"> Implementing energy efficiency tools. Strengthen the contribution of renewable energies in its energy mix. 	<ul style="list-style-type: none"> Diversifying its energy mix. Development of cogeneration capacity. Implementation of energy efficiency measures.
GHG reduction	<ul style="list-style-type: none"> Monitoring operations gas and air quality. Reducing NOx (nitrogen oxide), SO2 (sulfur dioxide), and CO2 emissions. 	<ul style="list-style-type: none"> Reduce CO2 emissions in operations. Monitoring GHG emissions. 	<ul style="list-style-type: none"> Improving air quality through the SULFACID technology. Implementing a slurry pipeline reduced consumption of fossil energy.
Green product or innovation	<ul style="list-style-type: none"> The development of Hydraulic road binder allows materials and waste from road to be reused as backfill. 	<ul style="list-style-type: none"> The development of hydrometallurgical process and techniques. 	<ul style="list-style-type: none"> The development of SULFACID technology. Implementation of a slurry pipeline.
Recycling	<ul style="list-style-type: none"> Transform waste into energy through Geocycle . Packaging is easy to recover and recycle. 	<ul style="list-style-type: none"> Recovery and recycling of mine waste. 	<ul style="list-style-type: none"> Recycling by-products (e.g. Phosphogypsum). Design an eco-friendly packaging for fertilizers.
Reduce Fuel Consumption	<ul style="list-style-type: none"> Transport loops; Use of light in weight trucks; Renewing the fleet every ten years. Use of GPS in trucks to avoid traffic jams. 	<ul style="list-style-type: none"> Optimize the transportation process to reduce distance and fuel consumption. 	<ul style="list-style-type: none"> Examining the use of ammonia as a shipping combustible Implementing a slurry pipeline reduced train transportation which consumes fossil energy. The use of GPS to minimize transport distances.
Resource optimization	<ul style="list-style-type: none"> Water management Wind energy management Transform waste into energy 	<ul style="list-style-type: none"> Development of tools to minimise water consumption. 	<ul style="list-style-type: none"> Reduce total water consumption. Supply from non-conventional sources (e.g. filtering sludge).
Waste management	<ul style="list-style-type: none"> Transform waste into energy (Geocycle) Control of discharges made at plants. 	<ul style="list-style-type: none"> Optimization of water recycling. Transform mine waste into energy. 	<ul style="list-style-type: none"> Identification, classification and treatment of waste according to their type.

Social practices

The companies under study implemented a wide range of social and human initiatives related to health and wellbeing. These social practices collected from the cross-case analysis are displayed in the following table (see

Table 2). These can be split into two categories: Health and safety measures; and encouraging partners to adopt sustainability practices.

Table 2: List of social practices and the sustainability aspect to which they belong.

Social aspects	LafargeHolcim Maroc	MANAGEM	OCP
Health and safety	<ul style="list-style-type: none"> ▪ Instruct drivers on defensive driving. ▪ Participating in several road safety awareness campaigns. ▪ GPS tools enable lorries to be tracked and driver conduct to be monitored while driving. 	<ul style="list-style-type: none"> ▪ Provide specific training on mining risks. ▪ Coaching for the teams at each site, in order to apply safety standards to the various aspects of their day-to-day operations. ▪ Training of warehouse workers to handle and storage of hazardous materials. 	<ul style="list-style-type: none"> ▪ Reduce combined Lost Time Injury Frequency Rate (LTIFR). ▪ Encourage drivers to respect the rules of eco-driving.
Encouraging partners to adopt Sustainable practices	<ul style="list-style-type: none"> ▪ Raise awareness of health and safety standards and integrate the “fatigue” factor into trip management. ▪ Organizing health and safety weeks. ▪ Developing SALAMATY service (designed to meet the requirements of the new building code, in terms of safety). 	<ul style="list-style-type: none"> ▪ Adoption of a new Occupational Health & Safety Charter. ▪ Organize safety awareness days. 	<ul style="list-style-type: none"> ▪ Organize exhibitions and participate in national forums organized like SIAM. ▪ Raise awareness among employees and collaborators about the importance of environment by the different workshops organized.

Benefits of SSCM adoption

During our investigation, we found that there are several advantages for companies operating in the Moroccan context to adopt Sustainable Supply Chain Management (SSCM) practices.

Improve reputation and brand image

Implementing SSCM practices can help these companies enhance their reputation and brand image, which is becoming increasingly important for customers who prioritize sustainability, especially in the case when companies are having international customers. This can lead to increased customer loyalty and attract new customers who share the same values (Mobley *et al.*, 1995; Zhu and Sarkis, 2007; Young *et al.*, 2010; Mourtaqa and Sabar, 2022).

Furthermore, to attract investors and financial institutions, companies need to demonstrate their commitment to sustainability. One way to showcase this commitment is by obtaining high scores from rating agencies that evaluate companies' sustainability practices, and therefore develop a much more compelling image in front of financial institutions and potential investors. These ratings are based on various criteria such as environmental impact, social responsibility, and corporate governance. Companies in Morocco start understanding the importance of sustainability for their growth and expansion. Therefore, they ensure to maintain high scores from rating agencies to display their engagement towards sustainability aspects. Our investigation revealed that the improvement of these companies' image over the years is outweighing the costs deployed by the company to make them more sustainable.

Improving performance and processes

Adopting SSCM practices can lead to cost savings in the long run, as it promotes the efficient use of resources, reduces waste and can improve overall supply chain efficiency. The linkage between implementing SSCM practices and the increase of the firm's performance had been studied and proved to be positive and significant (Golicic and Smith, 2013; Gopal and Thakkar, 2016).

We found in literature that SSCM can be costly in the short term but very beneficial in the long run (Walley and Whitehead, 1994; Wu and Pagell, 2011). An opinion shared by the logistics managers of the firms studied. They claim that the integration of even simple actions in supply chain, such as the use of GPS has a tremendous impact in reducing the transport distances, and consequently decreasing CO2 emissions.

The companies of study, all agreed that improving performance was one of benefits of implementing sustainability practices. SSCM can improve the company's performance through the reduction and cut back on energy, materials, and resource consumption, which lessen environmental effect as well as operating costs. Similar to this, recycling and waste management, increase process effectiveness while reducing resource consumption (and thus cost).

Moreover, while incorporating health and safety precautions into business operations may not directly increase the value of a company, but it can still be highly beneficial. By taking proactive measures to prevent accidents, companies can avoid the costly repercussions of workplace incidents. For example, a company with poor health and safety standards is likely to have a higher Lost Time Injury Frequency Rate (LTIFR), which can result in compensation claims and legal fees associated with workplace injuries. On the other hand, implementing effective health and safety measures can lead to a reduction in accidents and associated costs, such as workers' compensation claims, medical expenses, and lost productivity due to employee absences. Ultimately, investing in health and safety practices can help companies avoid financial losses and improve their overall operational efficiency.

Therefore, the adoption of SSCM practices not only has positive impacts on the environment and society, but also on the firms' financial performance and competitive advantage. The managers also pointed out that SSCM practices can create innovation opportunities, as they require companies to rethink their processes and find new solutions to improve their sustainability performance.

Building trust with stakeholders

Interviews conducted revealed that getting the international recognition due to their commitment to environmental, social and good governance practices, is a prove of their SSCM strategy's success.

Moreover, the logistics managers mentioned that the adoption of SSCM practices has also helped them in building trust with their stakeholders, such as customers, investors, and suppliers. They noted that customers are becoming more aware and concerned about the social and environmental impacts of the products they consume, and that they prefer to do business with companies that share their values. In addition, investors are increasingly interested in socially responsible investments, and suppliers are more willing to collaborate with companies that have a good reputation in terms of sustainability.

Additionally, our analysis uncovered that adopting SSCM practices can help companies comply with regulatory requirements of their stakeholders (international customers, shareholders, and financial institutions) related to sustainability and avoid potential legal and reputational risks associated with non-compliance.

In summary, our investigation revealed that major firms operating in the Moroccan setting might gain a variety of advantages by using SSCM techniques, both in the short and long terms. As SSCM practices foster a cooperative and responsible business culture, implementing them can help businesses improve their relationships with their suppliers and other supply chain stakeholders. This can lead to more efficient and effective supply chains, benefiting all parties involved.

Challenges facing the implementation of SSCM practices

Our investigation has uncovered a multitude of challenges that must be overcome to successfully integrate sustainability practices into supply chain management. These challenges encompass a range of factors including:

SSCM integration process

Implementing sustainable practices is a gradual and continuous process that requires from all parties engaged in the supply chain to invest a significant amount of time, energy, and effort. The process of implementing SSCM is complicated and not a straightforward process, as it must be done at several supply chain levels (Kusi-Sarpong *et al.*, 2019; Ghufraan *et al.*, 2021).

Interviews conducted revealed that incorporating sustainability practices into these firms' supply chains, took years and was a gradual process, as these company didn't adopt all the various aspects of sustainability all at once. This gradual adoption was due to the fact that these companies didn't want to disrupt other departments' missions, or affects their budgets.

Furthermore, the gradual adoption of sustainability practices was also driven by the need for these companies to maintain the quality and reliability of their products and services, while minimizing the negative impacts on the environment and society. This required thorough preparation, coordination, and communication across the different departments and stakeholders within the company.

Collaboration with stakeholders

It can be difficult to manage and implement sustainable practices across the entire supply chain as they are sometimes complicated and involve multiple stakeholders. It necessitates cooperation and coordination among suppliers, logistics providers, and other stakeholders, which can be challenging to accomplish.

Adjustment of organizational culture

It takes more than just a simple adjustment to the company's operations to adopt and implement SSCM. It requires a shift in organizational culture and values, which can be difficult to achieve. It entails a mindset shift among both employees, shareholders and suppliers so that sustainability is prioritized over quick profits. To develop a SSCM culture, this calls for a long-term commitment and financial investment in education and training programs.

Suppliers lack of awareness and commitment

Despite the numerous initiatives taken by the government to promote and encourage sustainable practices in supply chain management, the adoption of such practices in Moroccan companies has remained limited. A variety of factors, including the perception that it is expensive, a lack of knowledge about the long-term benefits, and the challenge of incorporating sustainability practices into current operations, explain why many organizations are still unwilling to invest in SSCM (Amaazoul, 2011; Mharzi, 2016). As the cost associated with implementing SSCM practices can be a significant barrier for small and medium-sized suppliers. Additionally, there may be a lack of understanding regarding the advantages of SSCM as well as a lack of regulatory pressure to enforce compliance with sustainability standards.

Measuring and tracking the impact of sustainability practices

According to our findings, firms must also invest in monitoring tools and processes to keep tabs on their progress toward sustainability targets and assess the success of their sustainability initiatives. This entails developing key performance indicators (KPIs) to assess how their sustainability activities affect the economy, society, and the environment. This can assist them in identifying areas where they need to improve and make necessary adjustments to accomplish their sustainability goals.

Despite these challenges, we believe that incorporating sustainability practices into supply chain management is crucial for companies to create long-term value, meet customer demands, and contribute to a sustainable future (Carter and Rogers, 2008; Seuring and Müller, 2008; Touboulic, 2014).

V. Discussion

For the purpose of this study, we decided to develop a classification of SSCM practices which is based on the different stages of supply chain, starting with procurement, and then moving to inventories, manufacturing, developing sustainable products, arriving to distribution and recycling. Without neglecting the human factor, who is the main actor behind sustainable supply chain's operations.

This classification was developed by combining different classifications found in literature. We borrowed 'responsible procurement' and 'sustainable packaging' from Zailani *et al.* (2012), who classify the sustainable supply chain management practices into two categories: environmental purchasing and sustainable packaging. While 'manufacturing practices' was derived from the model of Golicic and Smith (2013), which determines four different operationalisations of environmental supply chain practices: upstream facing practices, design practices, production practices and downstream customer facing practices. The rest of practices emanate from models developed by other researchers (Marshall, *et al.*, 2015; Gopal and Thakkar, 2016; Paulraj, Chen and Blome, 2017).

The practices composing the classification adopted for this research are as follow:

- **Practices related to procurement:** companies under study choose to work with suppliers who respect the environment, by making sure they follow the 'code of conduct' established by these companies. They also encourage and educate their suppliers about their environmental impact and the way to reduce it.
- **Practices related to manufacturing:** this type of practices aim to reduce as much as possible the emission of GHG, along with minimization and management waste, by programming ongoing monitoring of the impact of production sites on the local environment.
- **Practices related to inventories:** this type of practice focuses on optimizing raw material consumption and controlling waste in the plants. In order to avoid work accidents, the companies studied also instruct their warehouse workers.
- **Practices related to green products and innovations:** companies develop creative solutions and products to demonstrate their engagement towards the environment and social aspects.
- **Practices related to transport and distribution:** these practices consist mainly of performing routine vehicle preventive maintenance, while making drivers aware of safe transport practices. They also include optimising and using alternative energy solutions for the transportation process.
- **Practices related to Marketing and Packaging:** consists mainly of designing eco-friendly packaging that is easy to recover and recycle.

- **Practices related to the human factor:** these practices embody mainly coaching of employees, collaborators, suppliers and other partners to apply safety standards to the various aspects of their daily operations, ultimately leading to a reduction in the combined Lost Time Injury Frequency Rate (LTIFR).

Results have shown that the requirement to maintain the quality and dependability of the goods and services while avoiding interference with the objectives or financial plans of other departments, contributed to the progressive adoption of SSCM practices at different levels of the supply chain (Kusi-Sarpong *et al.*, 2019; Ghufran *et al.*, 2021).

Investigation also revealed that adopting SSCM practices improves the company's financial performance and competitive advantage as it helps optimize supply chain process (Walley and Whitehead, 1994; Wu and Pagell, 2011). Furthermore, stakeholders (mainly investors and financial institutions) more ready to work with businesses with a high sustainability reputation, as they are more interested in environmentally and socially conscious investments (Mourtaka and Sabar, 2022).

VI. Conclusion

This article explores the adoption of Sustainable Supply Chain Management (SSCM) practices in the context of large companies in Moroccan through a multiple case study approach. The aim is to provide insights into the challenges and benefits of incorporating sustainability practices into the supply chain management of these companies. The study reveals that the adoption of SSCM practices is a gradual process that takes years to be fully integrated into the company's operations.

This study also suggests a classification of SSCM methods based on the many supply chain stages, from procurement through inventories, manufacturing, developing sustainable products, and then to distribution and recycling. We've also included in this classification the human factor, who is the primary driver of a sustainable supply chain's operations.

The study also emphasizes the long-term benefits of SSCM practices and their favorable impact on the environment. Moreover, the study demonstrates that businesses that implement SSCM policies can obtain recognition on a global scale for their dedication to environmental, social, and good governance practices. Overall, the study's findings contribute to the understanding of SSCM practices in the Moroccan context and offer practical insights for companies looking to implement sustainable practices into their SSCM.

Nonetheless our research has limitations that need to be taken into account when interpreting its results. The research only analyzed a specific set of cases within a particular context. This means that the findings of the research may not be applicable to other contexts or situations. The research doesn't aim to provide statistical generalization, which would require a larger sample size and a more representative sample. Instead, the research aimed to provide analytical generalization by examining in-depth the unique characteristics and practices of the selected cases. The reduced sample size can also be explained by the fact that sustainable supply chain management is still a relatively new concept in the Moroccan context. It is important to note, however, that as the concept of sustainable supply chain management becomes more widely adopted in Morocco, the sample size may increase, providing more opportunities to study its implementation and impact in the future.

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Declaration of competing interest

We declare that there are no known financial interests or personal relationships that could have influenced the research reported in this research.

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