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THE STRUGGLE OF GREEN INNOVATIONS FOR ACCELERATING DIFFUSION AGAINST THE EXISTING REGIMES OF TASK AND INSTITUTIONAL ENVIRONMENT: LITERATURE REVIEW

Md. Shahzalal*

Abstract

'Sustainability' is getting interest of people from different backgrounds, but a little has been changing practically in the area since the inception of the concept. More research is needed to be done for the transition researchers to develop theory, models, strategies, and guidelines for the industries that are trying to save the society, environment and economy through green innovations. Green solutions have been fighting against the existing individual, socio-technical, and industry regimes of the task environment and institutional environment. This paper is based on literature review, which presents the drivers and barriers in existing regimes of task environment and institutional environment and a model to show how task environment and institutional environment, holding three existing regimes influence the diffusion of green solutions. In the paper the hypotheses are tested based on literature review in addition to a few cases are reviewed to justify the struggle of some green niche innovations. Finally, this research establishes 'ethics' and 'consumer education' as two important causes in accelerating the diffusion of green solutions.

Key Words: Sustainability, Green Innovations, Transition Research, Regimes, Ethics, Consumer Education, Diffusion,

* Lecturer, Department of Marketing, Begum Rokeya University, Rangpur, Rangpur 5404, Bangladesh

Introduction

Initiatives that are being taken greening industry are facing extreme pressure from the level of competency, knowledge, infrastructure, productivity, cost efficiency of the present systems as well as from people's routine lifestyle and industry practice. Sustainable solutions have to struggle against social, technical, political, and cultural barriers as well as against traditional morals, beliefs, values, regulations, stockholder interests, user preferences, and suppliers' power. During the struggle a few co-evolutionary approaches like changes in learning regarding environment, rise of green consumerism and social networks, new understanding of responsibility concept, increasing health consciousness, leading competencies through technological innovations and new form of interactions between stakeholders have been helping to overcome inertia and cause diffusion to accelerate. Therefore it is critical to understand the drivers that contribute in acceleration of diffusion and the barriers that hinder in accessibility of green innovations for both the academic and industry point of view. This understanding will help to develop new theories/models, and strategies to defeat/modify/change the existing regimes or to bring new transitions towards sustainability.

Aim and objectives of the research

The aim of the research is to depict the struggle of green niche innovations on the way to accelerate diffusion based on literature review. The specific objectives of the research are: to identify the drivers and barriers in existing socio-technical, industrial, and individual regimes, to clarify how some co-evolutionary drivers have been helping to accelerate the diffusion of green innovations by overcoming difficulties, to draw models and hypotheses in order to justify the influences of the existing regimes of task environment and institutional environment on green innovations, and to establish 'ethics' and 'consumer education' are key factors for accelerating diffusion of green solutions.

Research methodology

The findings of the research are outcome of the intensive literature review. The research has six stages, in the first stage the research concept is clarified by defining relevant terms, in the second stage the drivers and barriers in existing socio-technical, industrial, and individual regimes are identified along with arguments from past researches next, a model has been developed focusing how do the participants in the task environment and institutional

environment by holding existing regimes influence the diffusion of green solutions, later from the model three hypotheses have been drawn then hypotheses are tested based on literature review. The final stage explains why ethics and consumer education are the two important prospective factors to accelerate diffusion of green products. Data are collected from books, research articles of both printed and online journals, newspapers, magazines, and other sources on internet.

Definitions of relevant terms

Green innovations

According to Beise and Rennings (2005), green innovations consist of new or modified processes, techniques, practices, systems and products to avoid or reduce environmental harms". Generally green innovations refer to eco-innovation or environmental innovation, environmentally driven innovation or sustainable innovation which, is to be a 'reduction' of environmental impact; the 'introduction/creation' of environmental performance, and the 'improvement' of environmental performance (Hordern, et.al. 2008).

Regimes

According to Cambridge dictionary existing regime means a traditional system/management/method/.On the other hand Whitmarsh (2012) said regime means dominant institutions and technologies. Socio-technical regime include markets, user preferences, industry, policy, science, culture, technology and macro-economics, deep cultural patterns, macro-political developments (Geels and Schot, 2007). While describing Triple embeddedness framework of industries Penna and Geels (2012) said industry regime means the beliefs, cognitive frames, values, goals, missions, industry specific regulations, technical knowledge and capabilities of industry/firms . Individual regimes also present some drivers and barriers on the way to accelerate diffusion of green solutions. Scholars within the fields of sociology, psychology, anthropology, and political science recognize that people make a wide variety of suboptimal decisions that are biased in systematic and predictable ways because of lack of awareness of the individual, therefore it will require more than just a development of green technologies and lower costs for these technologies instead it is needed to influence changes in social structures, rewards, and incentives to create meaningful change (Hoffman and Henn, 2008). Most often, change at the regime level is incremental due to sunken investments, vested interests, habits, bureaucracy and other factors which afford

stability but at the same time constrain flexibility and opportunities for radical change (Whitmarsh, 2012).

Task environment and institutional environment

While describing Triple embeddedness framework of industries Penna and Geels (2012) said task environment includes suppliers, customers, industry/firms, and institutional environment includes policy makers, the general public, and social movements, organizations compete for social fitness and legitimacy, which arise from conformity to cultural beliefs (e.g. public opinion), social values (and stakeholder pressures), and regulatory-political pressures. According to Richard et.al., (2010) task environment includes sectors with which the organization interacts directly and that have a direct impact on the organization's ability to achieve its goals which includes the industry, raw materials, and market sectors, and perhaps the human resources and international sectors. Institutional environment includes political institutions such as the national structure of policymaking, regulation and adjudication; economic institutions such as the structure of the national factor markets and the terms of access to international factors of production; and socio-cultural institutions such as informal norms (Henisz, 2000).

Identification of the drivers and barriers in the existing regimes of task environment and institutional environment

In the above literature review a number of drivers and barriers are found. If they are categorized then it will be easy to understand which drivers and barriers are fall within which regimes. Moreover, a list of such motivators and de-motivators later will help to understand how the existing regimes of task environment and institutional environment affect the acceleration of diffusion of green solutions.

Environment	Regimes		
Task environment: suppliers, customers, industry/firms, raw materials, and market sectors, human resources, international sectors	**Industry regimes:** beliefs, cognitive frames, values, goals, missions, industry specific regulations,	**Socio-technical regimes:** optimism and pessimism, preferences, culture, technology, political extremism: left minded/right	**Individual regimes:** awareness of the individual, need for rewards and incentives, open or reluctance to
Institutional			

Environment: policy makers, general public, social pressure groups, opinion leaders, stakeholders, regulatory bodies, political organizations, government, economic institutions, socio-cultural institutions	technical knowledge and capabilities of industry/firms	minded, economics, informal norms, international factors of production	change, habits, motivation to learn, attitude toward collectivism, ethics, consumer education

Table 1: The drivers and barriers in the existing regimes of task environment and institutional environment.

The struggle of green innovations for accelerating diffusion against the existing regimes of task environment and institutional environment

A model

From the aforementioned list of drivers and barriers, it is clear that the participants in the task environment and institutional environment belong to certain regimes for instance, industry regimes, socio-technical regimes, and individual regimes. These regimes are sometimes treated as drivers and in other cases treated as barriers in the way to accelerate the diffusion of green solutions. For example, if a supplier is optimistic he or she believes that due to increasing individual awareness for green product more and more consumers will accept green solutions, ultimately, the demand for green raw materials will be increased and the supplier will work for inventing green solutions. On the other hand if the same participant in the task environment is pessimistic then he or she believes in the opposite picture and will not take initiatives for the diffusion of green solutions. The following model simply shows how task environment and institutional environment by holding three existing regimes influence the diffusion of green solutions. If the participant either from task environment or institutional environment belongs to favourable existing regimes then the diffusions of green solutions are accelerated. Unfavourable existing regimes hinder the diffusion of green solutions.

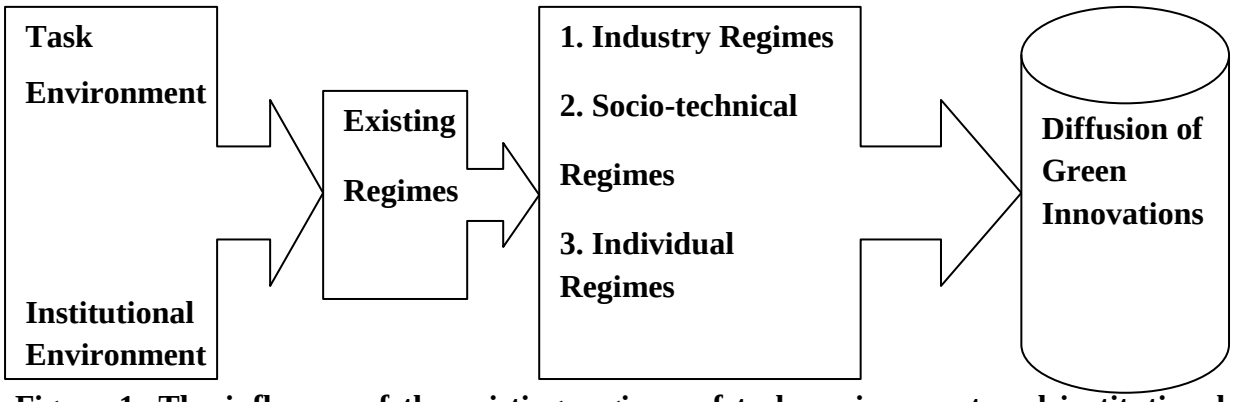

Figure 1: The influence of the existing regimes of task environment and institutional environment on green innovations for accelerating their diffusion.

.Research hypotheses

"Hypotheses go beyond research questions because they are statements of relationships or propositions rather than merely questions to which answers are sought" (Malhotra and Dash 2011). The following hypotheses are justified in the research.

H_1: The green niche innovations have been struggling against existing socio-technical, industrial, and individual regimes.

H_2: Some co-evolutionary drivers have been helping in accelerating diffusion of green innovations by overcoming difficulties

H_3: Ethics and consumer education have effects on accelerating diffusion of green solutions.

Literature review to prove the alternative hypotheses true

H_1: The green niche innovations have been struggling against existing socio-technical, industrial, and individual regimes.

Geels (2012) said that financial crisis has both the positive and negative influence on sustainability transitions, as a drawback ,the financial–economic crisis weakens public, political and business attention for environmental problems, he added, the early crisis years (2008–2010) created a window of opportunity for positive solutions but since 2010–2011 this window appears to be shrinking, with the financial–economic crisis having negative influences on sustainability transitions that may cause some slow-down. According to a survey conducted by Gyro International in conjunction with fastMAP, that green issues are not consumer top concern because of recent financial turbulence in UK, only 28% people

likely to accept paying a premium versus 32% in the US and 55% in mainland Europe (The Drum, 2010).

According to Dr. Uno Svedin (europa), the transformation of the European industry into new types of new technological green solutions was not such an easy path as was earlier perceived because the green solutions entailed new types of industrial –and political – stakeholders and that the green markets were weaker as well as continuity of the economic growth with more traditional sectors and with more traditional means and more traditional customers but the argument of seeing the crisis as the time for more long-term strategic changes and boosting new vigorous and "smart" policies and implementation of green character.

The tendency of government to encourage old practices is major barrier (AlKhidir and Zailani, 2009) to accelerate diffusion of green solutions. Time consuming regulatory requirements, fees or levies, very limited institutional support discourage smaller firms since the initial investment requirement (direct cost and transaction cost) by green methodologies such as green design, green manufacturing, green labelling of packing etc. are too high (Luthra et. al, 2011). The external environment in which a firm conducts its business will also influence the innovative capability as well as intention to adopt innovations (Hosseini, 2007). Diffusion of green solutions also hampered because of resistance to change by consumers themselves for example, clearly, many (green) innovations provide superior alternatives over existing products, yet they might require consumers to change habits and routines, or they conflict with people's belief structures or values (Bagozzi and Lee 1999; Ram 1987; Ram and Sheth 1989; Szmigin and Foxall 1998).

According to Satterfield et.al, (2009) the nontechnical barriers for sustainable innovations in an industry may be economic and financial; regulatory: environment, health, safety, and product quality; educational: students and professionals and organizational and cultural. They added the drivers for overcoming nontechnical barriers to sustainability are establishing a clear, measurable, actionable, and universally accessible definition of sustainability; creating and disseminating better information for better decision-making; reframing sustainability as an opportunity, investment, and pathway to innovation so it becomes a top priority; tearing down silos within and among organizations and build cross-functional teams; developing forward-thinking, collaborative regulations or incentives that can adapt to changing circumstances.

There are a number of supply side barriers that have influence on the acceleration of diffusion some of them are found in the research of Singh et.al,(2012), these are: less environmental pressures from stakeholders poor supplier commitment, problems in supply chain, ,inadequate coordination, increment in overall cost, purchasing of costly environmental friendly materials, inappropriate incentives, risk in adopting new green production measures, hidden costs, uncertainty in material recovery during recycling, routing uncertainty, difficulty in recycling for perishable products.

Age, values, beliefs, are also creating problems against diffusion of green solutions for example in UK the younger generation proved more concerned with 69% of under 45 year olds indicating concern and 8% indicating no concern, compared with 62% and 11% respectively of over 45 year olds. (The Drum, 2010). Consumer reactions are also important in the way to diffusion of green solutions. Consumer responsiveness to green solutions depends on the following socio-cultural drivers: income level, environmental considerations, education level, availability of information, quality of marketing/ advertising, attitudes toward science, product/service originality(differentiation, scale of distribution, fashion, ethical consideration, age of consumers, ethnics, origin of consumer, place of residence(urban/rural) ,(Bruno et.al, 2008).

The above literature review evidently say that the null hypothesis should be rejected and the alternative hypothesis H_1 is supposed to be true or in other words the green niche innovations have been struggling against existing socio-technical, industrial, and individual regimes.

> H_2: Some co-evolutionary drivers have been helping to accelerate diffusion of green innovations by overcoming difficulties

World-wide economic crisis is also opening the door to involve people more in green research and long term green development for example according to a new report of FAO (2012), urban populations are exceeding the capacity of African cities to provide food for them, putting nearly 300 million people at risk of hunger and malnutrition, and greener strategies – urban agriculture and better water use – could help considerably.

On the one hand, the increasing consumers awareness of the environmental impact of their consumption choices and their willingness to contribute to reduce the ecological footprint (Burke, et.al, 2003; Harrison, et,al, 2005) creates new market opportunities for companies. On the other hand, increasingly restrictive policies that punish environmental harmful

behaviours, and the actions of NGOs and other environmentalism groups' that raise the attention on arms' not-environmental-friendly behaviours (Spar and Mure, 2003; Kapstein, 2001), boost arms to control the effects of their activities on the environment in order to reduce reputation risks (Hockerts, 2007).

Singh et.al,(2012) mentioned the following drivers on the way to accelerate diffusion of green solutions: legal requirements of Government, social responsibility, public pressure, green image, global marketing, economic benefits or cost reduction benefits, competitiveness, green purchasing strategy, customer awareness, pressure & support,, environmental concerns of firm, employee's motivation, health & safety, ecological benefits, higher amount of waste generation, waste disposal problem, and corporate strategies to maintain market leadership. Supports for innovation from top management, quality of human capital, organisational knowledge accumulation capacity also have positive influences on the adoption of green innovative initiatives (Ho et al. 2009).

Social interaction (peer) effects are recognized as a potentially important factor in the diffusion of new products for instance in the case of environmentally friendly goods or technologies, both marketers and policy makers are interested in the presence of causal peer effects since social spillovers can be used expedite adoption Bollinger (2012).

From the above discussion it is certainly true that some co-evolutionary drivers have been helping in accelerating diffusion of green innovations by overcoming difficulties. In other way it can be said the H_0 is rejected and H_2 is true.

> H_3: Ethics and consumer education have effects on accelerating diffusion of green solutions.

Ethical practice and consumer education have influences on accelerating the diffusions of green solutions. In UK 48% people do not trust marketers' claims with regards to products/practices being environmentally responsible while 13% completely distrust (The Drum, 2010).Trust is important because there is a positive correlation between trust and development of long-lasting consumer relationships which, means a higher amount of trust among consumers will lead to a greater likelihood to purchase (Kilger and Romer 2007). Trust is built through ethical practices, which means, emphasizing on transparent, trustworthy, and responsible personal and organizational policies and actions that exhibit integrity as well as fairness to consumers and other stakeholders (Murphy, et. al, 2005).

In addition to, lack of consumer education leads to environmentally irresponsible and unwise buyer in the marketplace so it is important to educate and empower tomorrow's consumers today (Knights, 2000) because, consumer education contributes to society as a whole by creating more active and informed citizens, leading to a more even balance of power between the producer and consumer' [(McGregor, 2000), p. 172]. Consumer education is different from other forms of school, college and formal education and different from traditional marketing activities, which, can happen at work or in a wide range of social contexts (Office of Fair Trading, 2004) at any time to influence in behavioural change. It also provides a wide array of information and discussions on sustainable consumption, social justice, human rights, ethical values and poverty alleviation (Oogarah-Hanuman, and Boojihawon 2011).

For green solutions the two important things are: first, marketers need to build trust in order to accelerate their green product's diffusion so that consumers feel secure in purchasing what they believe. Second, marketers need responsible consumers in the marketplace so that their products are truly justified in contrast to non-green products for this reason consumer education is obvious to make socially and environmentally responsible consumers to increase the consumption of green solutions.

Here it is proved that ethics and consumer education definitely have effects on accelerating diffusion of green solutions alternatively it can be said that H_3 is acceptable. From the literature review mentioned earlier, it is found that ethical practice and consumer education are two important causes which if implicate the diffusion of green solutions will be accelerated than other means.

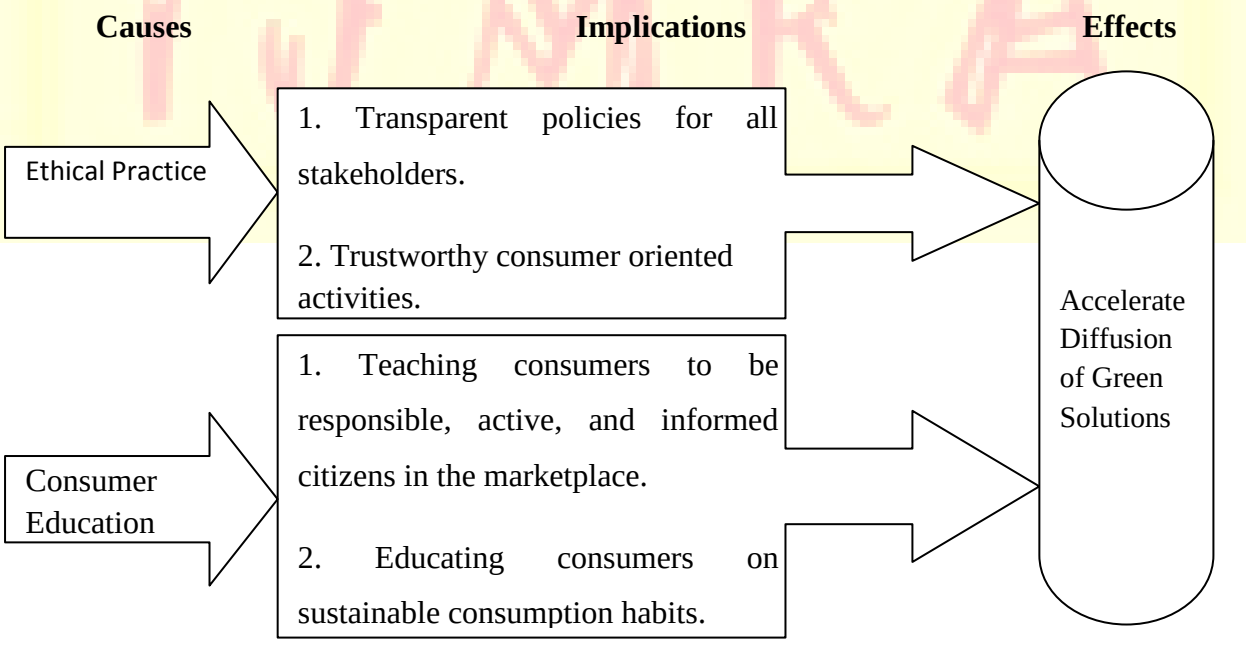

Figure 2: Ethical practice and consumer edication as causes, their implications and effects

Now of course, it can be said that if ethics is the primary concern of an organization then it will take transparent policies for all stakeholders as well as does consumer oriented activities consequently consumer feel trust and accept green solutions. Furthermore, if consumers are educated to be responsible and know why sustainable consumption habits are important then they will try green products more and more.

Cases to justify a few drivers and barriers in the way to accelerate the diffusion of green niche innovations

This section presents a short literature review relevant to the drivers and barriers, which have been encouraging or blocking the diffusion of organic food, renewable energy, and eco-friendly personal care products. The literatures show that in case of the aforementioned products the drivers and barriers in individual and socio-technical regimes play important role than drivers and barriers in the industry regimes in the task environment and institutional environment.

There is a growing demand for organic foods driven by consumers' perceptions of the quality and safety of these foods and by the positive environmental impact of organic agricultural practices (Vindigni et.al., 2002). According to Timmins, (2010) out of all 1,407 people interviewed, no-one was purchasing organic 'always / mostly' in every category they made, only 2% of consumers bought organic produce in every category they made purchases in because of organic knowledge, supply availability, low level of loyalty, price and origin conscious, no food production concerns (mixed views on organic produce), environmental doubters and organic detractors (broadly negative to organic produce), conflict between organic and local, trust and confidence regarding health, taste, real level of chemicals and animal welfare.

Lu, (2011) has mentioned relative EU and UK regulations, two-year action Plan, public procurement at school, cooperation between organic producers and retailers, solving the asymmetric information problem of organic milk, neither expensive nor complicated, social and practical environment to develop into a habit, academic research reports and public mediations, higher average income than conventional farmer have been helping to accelerate

the diffusion of organic foods. But he also mentioned the following barriers are found on the way of diffusion like: relatively high rate of taxation compared to other European countries, consumers still feel that they only get little information about the benefit of organic milk, identification and location in supermarkets are not convenient when consumers face time , constraints and uncertainty about the quality, large supermarkets own the dominant economic power in the whole supply chain, UK government does little to encourage the organic milk consumption.

Herring et.al (2007) has mentioned the factors that encourage the use of renewable energy in home are: save energy/ reduce fuel consumption, reduce fuel bills/save money, concern for environment/ global warming/reduce emissions, had funds available to invest, received a grant/special offer. According to them the obstacles are: fuel savings not worth cost, too expensive, trouble in clearing loft, loss of loft storage space ,disruption in home, too much trouble to install, reputation for unreliability, don't fit existing light fittings, unpleasant or unsuitable, quality or colour of light, ugly and/or too large, not widely available

The important drivers to use green solutions for personal care are the research articles published online or newspapers, and the promotions by green marketers. The concern of side effects of personal care products among consumers are increasing because of research reports, online articles published by green innovators. Consumers now conscious that skin readily absorbs chemicals and other substances deeper into body– through skin layers, into muscles and fat, and ultimately into bloodstream, cause a wide array of problems like cancer, developmental/reproductive toxicity, allergies, immunotoxicity, neurotoxicity, endocrine (hormonal) disruption, organ system toxicity, irritation (skin, eyes, or lungs), enhanced skin absorption (some chemicals actually cause our skin to absorb even more chemicals!), biochemical or cellular level changes (Langford, 2011).

Promotional campaigns by marketers are highlighting the questions in their advertisements like how green is your clean. Are the products you use to clean your house affect your health? What do cookware, food, storage containers,lightbulbs, and furniture have in hazardous waste at home? Ever wonder what to do with unwanted paint cans, batteries? Learn about the household cleaning product choices you have to make your home clean and safe? All may affect your health and then environment, what is really in your deodorant, perfume, or makeup" how safe are your personal care products (Winnebeck, and Hernandez, 2012).

Conclusion

Green solutions have been struggling against a number of existing regimes of task environment and institutional environment in the way to accelerate diffusion, but fortunately some co-evolutionary drivers have been helping to overcome inertia since the primary stages of many green products. Although, only the acceleration of diffusion of green solutions can bring true sustainability, it requires a new way of thinking, whether about the value of our resources, the costs of our actions on society as a whole, the relationship of our job function within the corporate structure, or any of a number of similar philosophical concepts (Satterfield et.al, 2009).This is the time to come out from the existing regimes by thinking positively. Marketers first need to establish faiths among consumers about themselves through stakeholders' oriented policies. Second they need to take initiatives themselves in order to educate consumers instead of depending government or other organizations to ensure the presence of enough sustainable consumers in the marketplace for accelerating diffusion of green solutions.

Limitations and directions for further research

Eventhough, this is a literature review based research, there are some journal articles, books, and newspaper articles relevant to the present research have not been reviewed. In future, research can be done to explain the models in detail. The hypotheses can be tested by empirical study. Case studies and causal research can be done to prove that 'ethics' and 'consumer education' are the two major variables to accelerate the diffusion of green solutions.

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