ADOPTION OF GREEN BUILDING GUIDELINES IN DEVELOPING COUNTRIES BASED ON U.S. AND INDIA EXPERIENCES

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ABSTRACT

In the wake of sustainable construction entering the mainstream, many developing countries are either currently pursuing green building guidelines or are planning to pursue them in the near future. This research attempts to formulate an implementation strategy for the rapid adoption of these guidelines for the developing nations. This implementation strategy is based on the detailed review of the major green building guidelines globally and contextual information of Indian society collected through a survey questionnaire. The proposed strategy shows that it is important for green building initiatives to identify: the organizations that accelerate the adoption of green building guidelines in a society, the incentives and barriers associated with the green building guidelines, and the necessary motivations for the adopter organizations. An informed approach in the form of this implementation strategy might potentially contribute to the acceleration of green building guidelines' adoption in developing countries.

KEY WORDS

Green Buildings, Green Building Guidelines, LEED®-USA, BREEAM-UK, CASBEE-Japan, LEED®-India, Societal Attributes, Diffusion of Innovation

INTRODUCTION

There has been a significant increase in the interest and research activities related to the development and promotion of green building guidelines in the last decade (Seo 2002). The first green building guideline, Building Research Establishment Environmental Assessment Method (BREEAM) was introduced in the U.K. in 1990 (BRE 2007). Since then, there has been a rapid growth in the number of green building guidelines around the world. More than twenty-three, mostly developed countries, have implemented their green building guidelines and many other developing nations are in the process of framing these green building guidelines for their societies (Melchert 2005).

Present day acceptance of green building guidelines in developed nations can be attributed to the relatively long history of green building movements in these nations. Many of the developing countries have practices that are sustainable in nature due to the scarcity of resources; however, most are not uniform practices. As a result, certain aspects of sustainable strategies for building design and construction become the focus in these countries, depending on the regional characteristics and needs (e.g. establishing new developments in dense areas as a site selection strategy, use of low flow fixtures for water efficiency, and utilization of solar hot water panels as renewable energy technologies), while other approaches are not practiced systematically. To establish a systematic use of all sustainable approaches, uniform, recognized, and internationally compatible standards are needed. This need is more evident in developing countries where the economy and national organizations are

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growing, and foreign investments are being made that increase construction activities. The introduction of such guidelines to establish uniform standards for the application of sustainable practices and their acceptance has been a recent trend in the developing countries. The next challenge for these developing countries is the formulation of implementation strategies that can ensure the rapid adoption of these green building guidelines in their societies (Bondareva 2005, Dalal-Clayton et al. 1994, Landman 2005, Melchert 2005).

As a developing country, India has witnessed major progress in the context of green building guidelines since 2001. There are three major green building guidelines currently being adopted in India: (1) LEED®-New Construction (LEED-NC); (2) GRIHA® by The Energy and Resources Institute (TERI) that was established voluntarily to rate buildings according to three categories, namely preconstruction, planning and construction, and building operation and maintenance stages ; and (3) LEED®-INDIA released by the Indian Green Building Council -the structure and content of which is based on LEED-NC and includes alterations based on Indian construction needs. Though the rate of adoption of the green building guidelines has been rising, it is negligible in context of the Indian construction industry which accounts for approximately 10% of the gross domestic product (CIDC 2007). For example, 11,188 LEED® registered projects exist but there are only forty registered projects under LEED-India (USGBC 2008). With a great growth potential in the green building market, India is in need of rapid adoption strategies of green building guidelines as well as many other developing countries; India, therefore, presents a qualified pilot case for investigation in this area.

The overall goal of this research is to formulate an implementation strategy for the rapid adoption of green building guidelines in developing countries. The objectives of this research are:

- To identify the characteristics of a green building guideline that can support its adoption based on the comparative review of existing guidelines,
- To analyze the attributes associated with the adoption of green building guidelines in a society based on U.S. and India experiences, and
- To propose an implementation strategy for accelerating the adoption of green building guidelines in a developing country based on the India experience.

To achieve the study goal, this research included a comparative analysis of the existing literature on green building guidelines and a field study that utilized survey implementation in the green building market of India.

LITERATURE REVIEW

To identify the attributes necessary for the rapid adoption of these guidelines in a society, the researchers conducted a comparative review of major existing green building guidelines worldwide which will be presented first in this section, followed by a review of the societal attributes associated with them.

Green Building Guidelines

The green building guideline review is limited to LEED-NC-U.S.A., BREEAM-U.K. and CASBEE-Japan because of their relative success in their respective societies and, their influence on other countries. A summary of their comparative review is presented in Table 1 (Potbhare and Syal 2008).

Leadership in Energy and Environmental Design (LEED®) (USGBC 2008) LEED® is a credit based building rating system developed by the U.S. Green Building Council (USGBC). Based on the number of credits achieved, a project is certified with one of the four levels: platinum, gold, silver, and certified. The credits can be earned in six categories: sustainable sites, water efficiency, energy and atmosphere, material and resources, indoor environment quality, and innovation and design. LEED® has experienced an exponential growth. Since its inception in 2000, membership in the USGBC has increased ten-fold. Presently, more than 15,259 organizations including corporations, government agencies, non-profit organizations and others are members of USGBC. As of October 2008, there are almost 15,000 projects registered for LEED® certification. In addition, there are more than 62,000 LEED® accredited professionals (AP) and more than 91,000 individuals are actively engaged in the promotion of LEED®.

TABLE 1. Comparative Review of LEED®-NC-U.S.A., BREEAM-U.K., and CASBEE-Japan.

Description	LEED®-NC (USGBC-2007)	BREEAM (BRE-2007)	CASBEE (JSBC-2007)
Parent Organization	U.S Green Building Council	Building Research Estabilishment Ltd.	Japan Sustainable Building Consortium
Country	U.S.	U.K.	Japan
Year of origin	2000	1990	1998
Type of Ratings	Certified 26–32 Silver 33–38 Gold 39–51 Platinum 52–69	Pass 25–39% Good 40–54% Very Good 55–69% Excellent 70 % & above.	BEE 0–0.5 BEE 0.5–1.0 BEE 1.0–1.5 BEE 1.5–3.0 BEE 3.0 & above
Major Categories	• Sustainable Sites • Water Efficiency • Energy and Atmosphere • Material and Resources • Indoor Environmental Quality • Innovation & Design	• Management • Health & Well Being • Energy • Water • Materials • Land Use • Pollution	**Q (Building Environmental Quality)** • Indoor Environment • Quality of Service • Outdoor Envi. on Site • Reduction of Building • Environmental loading **L (Building Environmental Loadings)** • Energy • Resources & Materials • Off-Site Environment
Building Typologies	• New Construction & Major Renovations • Existing Buildings • Schools • Homes • Neighborhood Development	• Eco-homes • Industrial • International • Multiresidential • Prisions • Offices • Retail • Schools	• New Construction • Heat Island • Urban Development • Detached House
Total scores	69 points	70 Points (Offices)	Level 5 in each category
Certification Cost	$1250–$17500	$1290 at each stage (Maximum expected cost—$17,500)	$3570–$4500
Total no. of registered and certified projects	12,659	600+	7
Resources available for registered project teams	Rating system, Checklist, Credit Interpretations, Application Guides, online template & FAQs	Assessment prediction checklist	Rating system and Manuals
Level of Detail Check	Administrative and credit audits	Detailed Assessment of documentary evidence	Document Review & it depends on the selection of assessment tools
Third Party Certification and Verification Process	Yes	Yes	Yes
Assessor Qualification	Trained and must pass assessor examination	Trained and licensed by BRE	Trained and must pass assessor examination. Must be a qualified first class architect
Result Product	Award letter, certificate and plaque	Certificate	Certificate and project shown on the website

The Building Research Establishment Environmental Assessment Method (BREEAM) (BRE 2007, Bunz 2006) BREEAM was introduced in the U.K. by the Building Research Establishment (BRE) in 1990 as the first voluntary building assessment method in the world. Major categories addressed in BREEAM are: management, energy, water, land use and ecology, indoor environmental quality, transport, materials, and emissions. Credits are awarded based on the building's environmental performance in these categories. A weighting system is applied to obtain the final BREEAM rating which is awarded as: pass, good, very good, and excellent. This weighting system is updated periodically and is done by consulting a wide range of professionals in the U.K.

The assessment of a building under this system is done by a specialist assessor licensed by the Building Research Establishment (BRE). The information related to the credits in BREEAM is not available to the public and requires the participation of the company and the BRE licensed assessors. The parameters involved in this method have a national range and refer only to the buildings in the U.K. Many countries have developed their environmental building assessment systems based on BREEAM. For example, the Hong Kong Building Environmental Assessment Method (HK-BEAM) of Hong Kong and the Building Environmental Performance Assessment Criteria (BEPAC) of Canada are based on the BREEAM method and were introduced in 1996 and 1993 respectively (WGBC 2007).

The Comprehensive Assessment System for Building Environmental Efficiency (CASBEE) (JSBC 2007) CASBEE was introduced in Japan as a voluntary building assessment system in 2001 by the Japan Sustainable Building Consortium (JSBC). Detailed statistical values of the predicted consumption of energy, water, land use, materials, and environmental emissions as well as the measurable aspects of indoor environmental conditions are required for the assessment of a building using this system.

CASBEE evaluates the building's environmental quality against the amount of resources the building consumes from nature. CASBEE can be categorized under two basic divisions: Building Environmental Quality (Q) and Building Environmental Loading (L). In CASBEE, the points are allotted based on the building's environmental performance in each subcategory. These points are multiplied by the weighting coefficients to obtain the final score. The final Building Environmental Efficiency (BEE) score is usually between 0.5 and 3.0.

Based on this review, some characteristics of these green building guidelines are identified which may have affected their acceptance in the society. The flexibility of credit choices, availability of information related to the credits through websites, reference manuals, and competitive advantage associated with LEED® may have catalyzed its acceptance in the U.S. The complexity of CASBEE and lack of flexibility in the choice of points may have hindered its rapid adoption in the Japanese society.

The lack of information available to the public related to the credits in BREEAM might have also affected the trialability associated with this green building guideline and its acceptance in the British society. Based on the detailed review of the three green building guidelines and the researchers' past work with green buildings in the U.S. context, LEED® was found to have characteristics that can be viewed as positive for adoption in the U.S. society. These include: simplicity to understand, flexibility, broad scope, acceptability and involvement in development by private and public sectors, successful brand name, and marketing of the system.

Societal Attributes Associated with Green Building Guidelines

The attributes of the society such as environmental awareness, education level, and skilled workforce affect the adoption of green building guidelines (Bondareva 2005, Dalal-Clayton et al. 1994, Landman 2005, Melchert 2005). These attributes are termed as the societal attributes in a country and vary according to the unit in the society that adopts these guidelines. Units in the society that can adopt the green building guidelines are classified under three categories for this research as shown in Table 2 below.

Government Endorsement of a green building guideline by the government can accelerate its adoption in a country. Governmental initiatives in the form of a policy or a regulation can provide

TABLE 2. Classification of the units in a society adopting green building guidelines.

Category name	Organization adopting green building guidelines
Government	Federal, state and local governments and related organizations, semi-government organizations, political leaders
Profit and non-profit organizations	Large business houses, multi-national corporations, community groups, media, trade organizations, manufacturers, suppliers, universities, educational institutions, non-governmental organizations, environmental groups
Individuals	General contractors, engineers, architects, owners, developers, sustainable building consultants, consumers

incentives to organizations to incorporate these guidelines in their projects. Government acceptance of these guidelines may validate their effectiveness to the society. Below are initiatives a government can undertake to catalyze the adoption of green building guidelines (Bondareva 2005, Dalal-Clayton et al. 1994, Landman 2005):

- Provide subsidies and tax benefits to the adopters,
- Enforce special laws and regulations,
- Provide funding and research data to the non-governmental organizations (NGOs) and environmental groups,
- Provide information to the public by publishing articles and promoting these guidelines in the media,
- Monitor and assess private actions that pose threat to the adoption of these guidelines in the society, and
- Take capacity building measures to increase the awareness of these guidelines in the society.

Some attributes associated with the government that may hinder the adoption of green building guidelines in society are shown below (Bondareva 2005, Dalal-Clayton et al. 1994, Landman 2005):

- Corruption within the government;
- The gap between the actual implementation and the government's false belief that once they formulate the policy or pass a law it will be implemented;
- The difficulty of enforcing the sustainable building regulations in the society;
- The need to prioritize other issues of national interest such as poverty, unemployment, and illiteracy.

Profit and non-profit organizations This category represents the largest portion of green building guideline adopters in the society. Information related to economic, environmental and reputational benefits associated with green building guideline adoption should be provided to motivate these organizations. To ensure the rapid acceptance of green building guidelines, it is essential to provide incentives and resolve barriers for the adopter organizations in this category. Some incentives that can be given to these adopter organizations are shown below (Bondareva 2005, Dalal-Clayton et al. 1994, Landman 2005):

- Proactive governmental agencies that encourage green building guidelines' adoption;
- Institutional framework that provides effective implementation of green building guidelines;
- Educational programs and seminars to increase awareness among owners, developers, constructors, and policy makers related to green building guidelines;
- Reliable information on cost and other benefits of green building guidelines;
- Publicity through media (e.g. print media, television shows, radio programs, internet) to promote the adoption of green building guidelines.

In addition to these incentives, the barriers associated with the adoption of green building guidelines need to be resolved as to not hinder the process of adoption as well as cancel out the incentives given by the governmental agencies. Some of the existing barriers associated with the adoption of these guidelines are shown below (Bondareva 2005, Dalal-Clayton et al. 1994, Landman 2005):

- Lack of infrastructure such as availability of certifying agencies, demonstration projects,

information related to green building guidelines at local or regional levels;
- Unorganized nature of the construction industry;
- High cost associated with the certification, "green" products and "green" technology;
- Lack of incentives such as grants or tax relief from the government;
- Unclear information on the recovery of long-term savings on the adoption of "green" technology or products in the projects;
- Lack of financing from banks for adopting green building guidelines;
- Lack of training / education in sustainable design or construction;
- Lack of expressed interest from clients such as owners or developers;
- Lack of technical understanding on the part of subcontractors, product manufacturers related to "green" technology.

Individuals This category is represented by owners, developers, general contractors, engineers, architects, and sustainable building consultants. Individuals in this category generally provide the services associated with the construction of a building. It is, therefore, necessary to bring awareness related to the green building guidelines among these individuals as they are the service providers to various organizations in society. Seminars, conferences, workshops or courses should be conducted for the promotion of these guidelines among the individual adopters. The incentives and barriers associated with the adoption of green building guidelines for individuals are similar to those of profit and non-profit organizations.

METHOD

This study first reviewed the existing green building systems used worldwide and critically analyzed them to identify the characteristics of a green building guideline that can support its adoption in a country. Secondly, a survey was prepared based on the identified societal attributes in the literature review to collect the contextual information associated with the adoption of green building guidelines in India as a developing country.

Survey Implementation

Based on the understanding of the societal attributes associated with green building guidelines from the literature review, a survey questionnaire was designed to collect the contextual information of Indian society (Potbhare and Syal 2008). This questionnaire consisted of 13 questions which were divided into the following four parts:

Part 1 Demographic information of the respondents
Part 2 Understanding and involvement with green building guidelines
Part 3 Adoption of green building guidelines
Part 4 Groups / occupation types and their timing in adoption of the guidelines

The survey questionnaire was circulated among 206 participants in India. These participants were the adopters of green building guidelines, researchers, teachers and government officials. Criteria for the selection of these participants are as follows:

- Should have worked or been associated with the design or construction of a green building in India or
- Should be currently doing or has done research related to the green building or green building guidelines in India or
- Should be associated with the policy formation/ governmental initiatives related to the promotion/research and development of green buildings in India.

DATA COLLECTED

The response rate to the survey questionnaire was 21% with 44 responses. Eighteen responses were received within the first 3 days of the survey circulation. Architects, engineers, sustainable building consultants, educators, as well as researchers were among the highest respondents of the survey questionnaire, whereas only 4% of the 139 government officials responded. This suggests that there is a lack of government initiative or interest related to rapid adoption of green building guidelines in India. The reasons for a high response rate from architects, engineers, and sustainable building consultants can be attributed to the awareness of green building

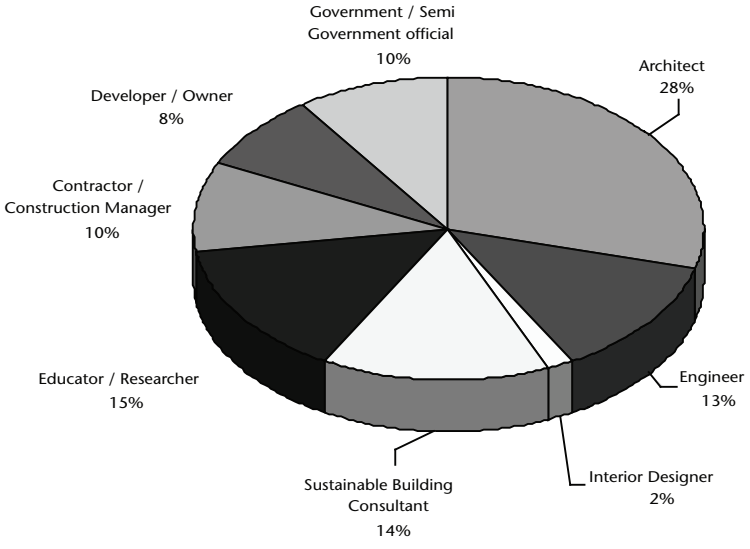


FIGURE 1. Distribution of the respondents' professional affiliations.

guidelines as well as their initiatives to address issues such as energy, natural resources, and material conservation in the building design and construction. The distribution of professional affiliations of the respondents is shown in Figure 1.

RESULTS

Characteristics of a Green Building Guideline

Based on the detailed review of the green building guidelines in the U.S., U.K., and Japan, characteristics of a green building guideline that can catalyze its adoption in a country were identified. A developing country can incorporate these characteristics to frame a green building guideline for its society. Following is the list of these characteristics (Rogers 2003, Potbhare and Syal 2008, Yudelson 2007):

- Complexity—A green building guideline should be easily understood by the adopters;
- Compatibility—A green building guideline should be in sync with the current construction practices adopted in the society;
- Trialability—Adopters should be able to preview the credits and verify in advance their choice of credits, even before the registration of their projects under a green building guideline;
- Observability—Demonstration projects should be available so adopters can visit and experience the benefits associated with the adoption of a particular green building guideline;
- Competitive advantage—This characteristic relates to the social benefits associated with the adoption of a green building guideline. For example, to be in the forefront among peers by the adoption of green building guidelines;
- Availability of information—Variety of information sources such as internet, print media, newspapers, should have information related to the green building guidelines, their credits, and example projects;
- Flexibility and adaptability—Adopters should have choices for the credit selection within different categories of a green building guideline;
- Cost—Documentation and certification costs and soft costs (e.g. cost associated with time devoted to material search, commissioning, energy modeling, and day lighting simulations) related to acquiring a rating under a green building assessment system might be high enough to hinder project teams from going for those ratings. As an example, the State of Michigan requires public buildings to be designed and constructed in accordance with the LEED®certification system, but does not necessarily acquire a rating in every project due to high costs associated with it (MI-ED, 2009). For wide adoption of green

building guidelines, the cost associated with achieving the ratings should be reduced. The expectation is that the soft costs will go down as the application of green buildings becomes more of a regular practice for building professionals.

Analysis of the respondents' understanding and involvement with green building guidelines

In response to the open-ended question on the understanding of the green building guidelines, 18 respondents suggested that green building guidelines reduce the impact of a building on its surrounding environment, thereby reducing its environmental cost. Thirteen respondents advocated the energy and material conservation aspects of green building guidelines. Many also agree that the green building guidelines served as a mode to save or respect the environment and as a medium to bring awareness in society on the issues related to environmental conservation.

Thirty three agreed that workshops and seminars were essential in distributing knowledge regarding green building guidelines. The other preferred sources of information as shown in Figure 2 were education or courses on these guidelines, magazines, clients, books, internet and the research studies.

In response to the question related to the respondent's involvement with green building guidelines, most of the individuals reported having worked on a green project. Figure 3 provides the distribution of the responses to this question. Other major sources of involvement for the respondents were being a green building consultant and a participant in various types of meetings on these guidelines.

Analysis of the responses related to the adoption of green building guidelines

The current adopters of green building guidelines represent a small fraction of the Indian construction industry. Their motivation to adopt these green building guidelines can be linked to the potential societal benefits associated with these guidelines. Figures 4 and 5 show the respondents' and their organizations' motivations to incorporate green building guidelines in their projects. These motivations

FIGURE 2. Sources of information related to green building guidelines.

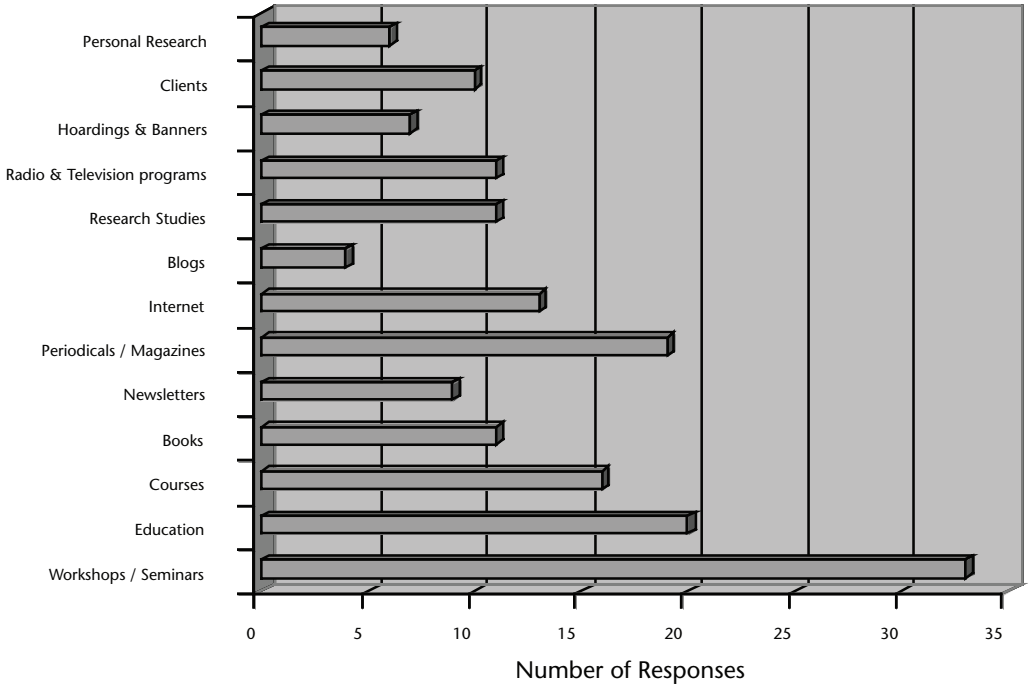


FIGURE 3. Involvement of the respondents with the green building guidelines.

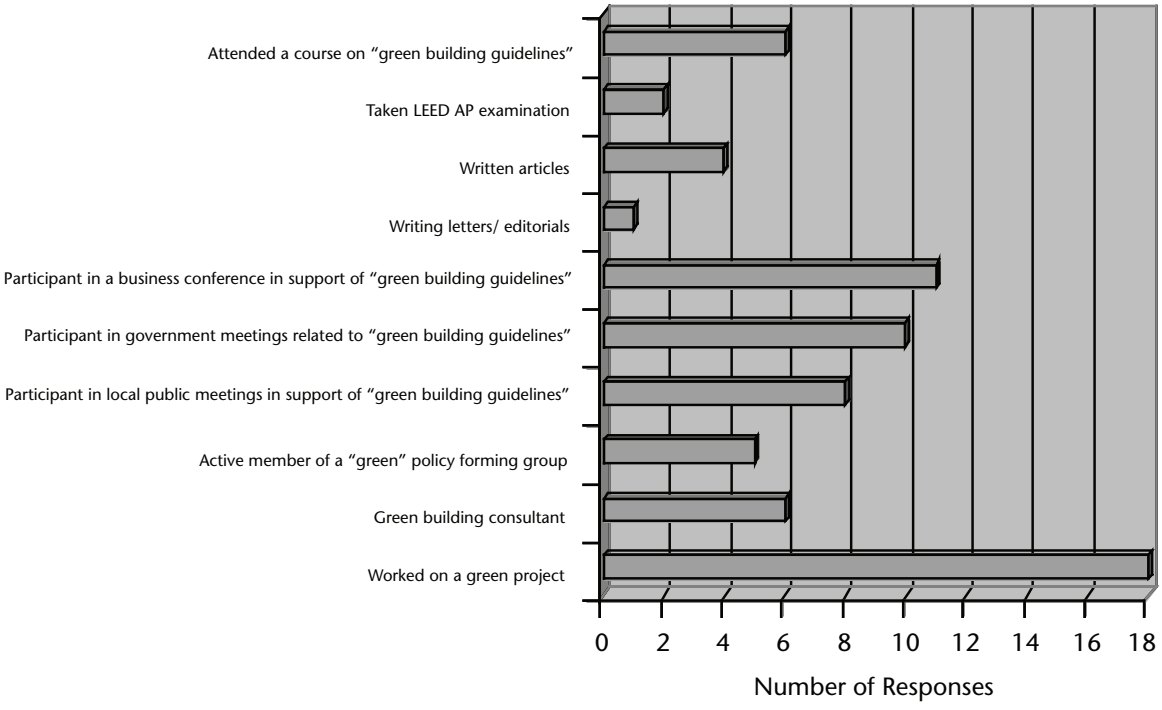


FIGURE 4. Individual's motivation to adopt green building guidelines.

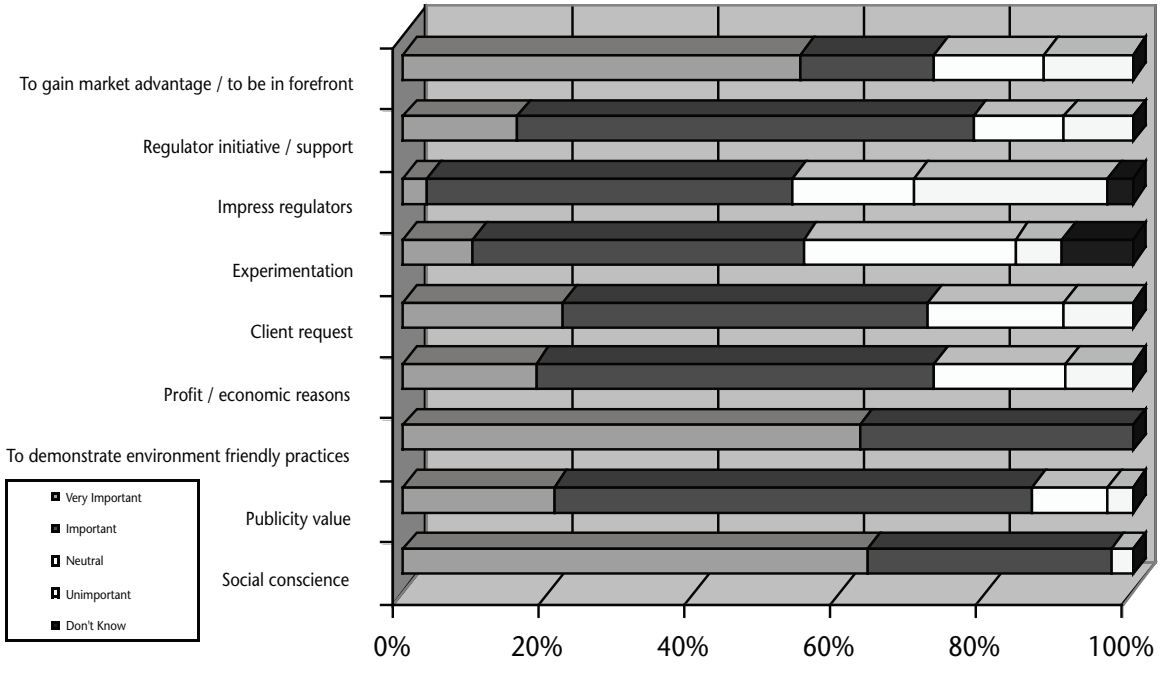
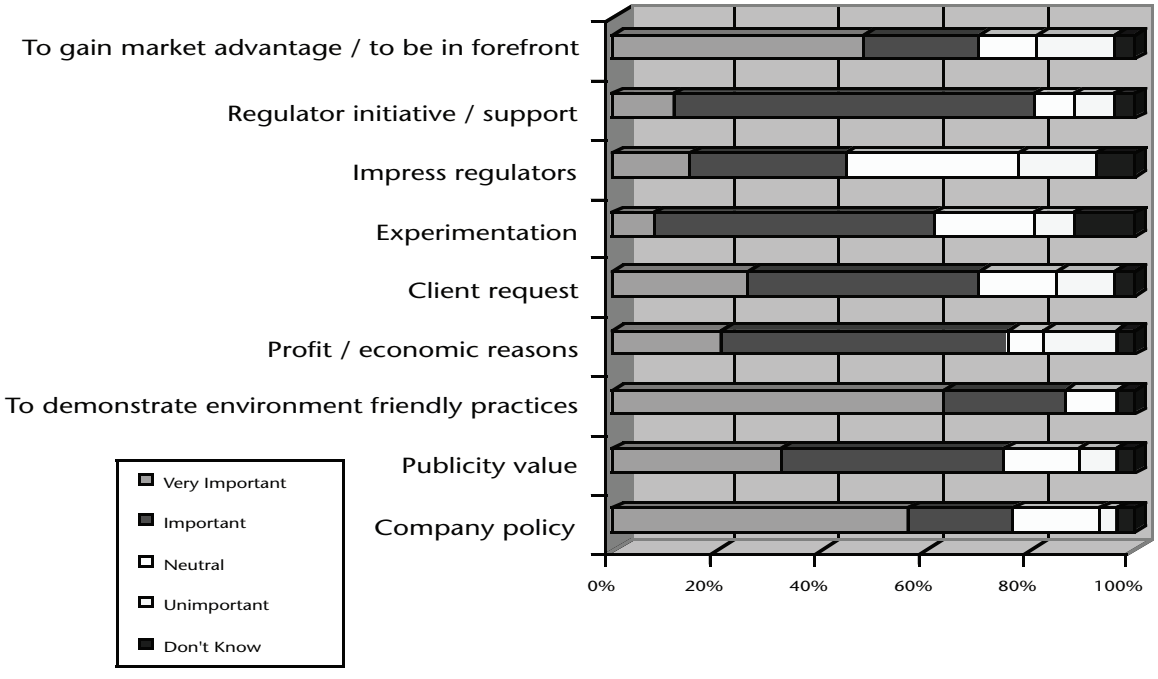


FIGURE 5. Company's motivation to adopt green building guidelines.



can be promoted in Indian society, in order to catalyze the adoption of green building guidelines.

In response to the question relating to incentives that catalyze the adoption of green building guidelines, 35 respondents agreed that availability of better information related to the cost and benefits of green building guidelines is crucial for its adoption. Figure 6 shows the distribution of responses related to important incentives associated with green building guidelines.

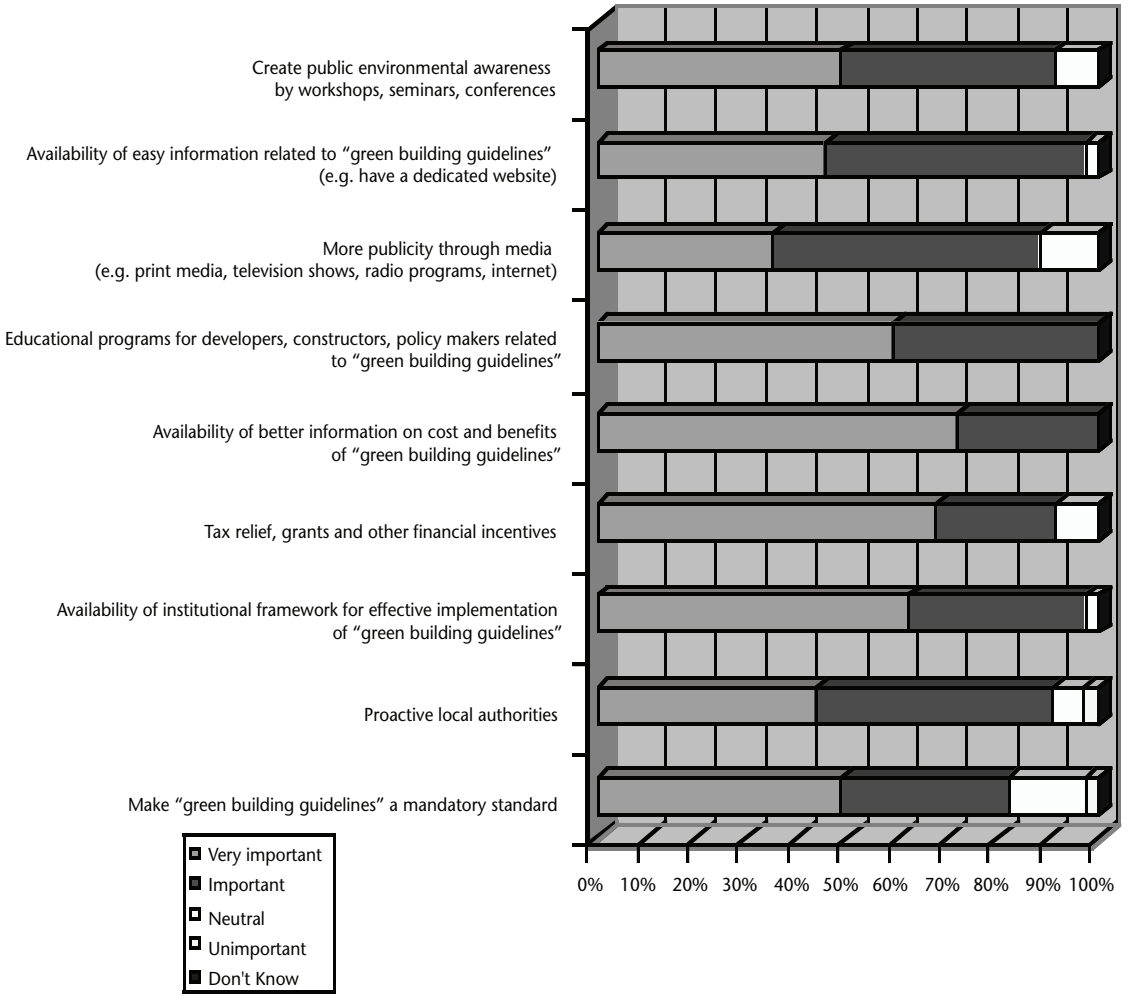
The cost associated with the adoption of green building guidelines and the lack of incentives by the government were identified as the most important barriers that prevent the adoption of green building guidelines in India by the respondents. These barriers need to be resolved in advance to ensure the successful acceptance of these guidelines in the society. Figure 7 shows the distribution of the responses on the barriers present in Indian society which affect the adoption of green building guidelines.

Analysis of the responses related to the groups / occupation types and their timing in adoption of the guidelines

The questions for this section of the survey were formed according to the "Diffusion of Innovation" theory. In this theory, the adopters of any new innovation or an idea can be divided in 5 categories depending on their personality types and on their time of adoption (Rogers 2003, Yudelson 2007). Figure 8 shows the categories of diffusion of innovation.

This theory assumes a "normal distribution" of innovation adoption with a typical 10 year mean time to reach 50% of potentially available market. The classical "Diffusion of Innovation" theory is basically intended to be applied to technology innovations such as telephones, videocassette recorders etc. The introduction of green building guidelines can also be considered as an "innovation" in the construction industry as these building rating tools analyze, rate and certify a building against a set of energy and environmental design criteria (Rogers 2003, Yudelson 2007). As an example to its categories in the green building market context, in the

FIGURE 6. Incentives necessary to catalyze adoption of green building guidelines in India.

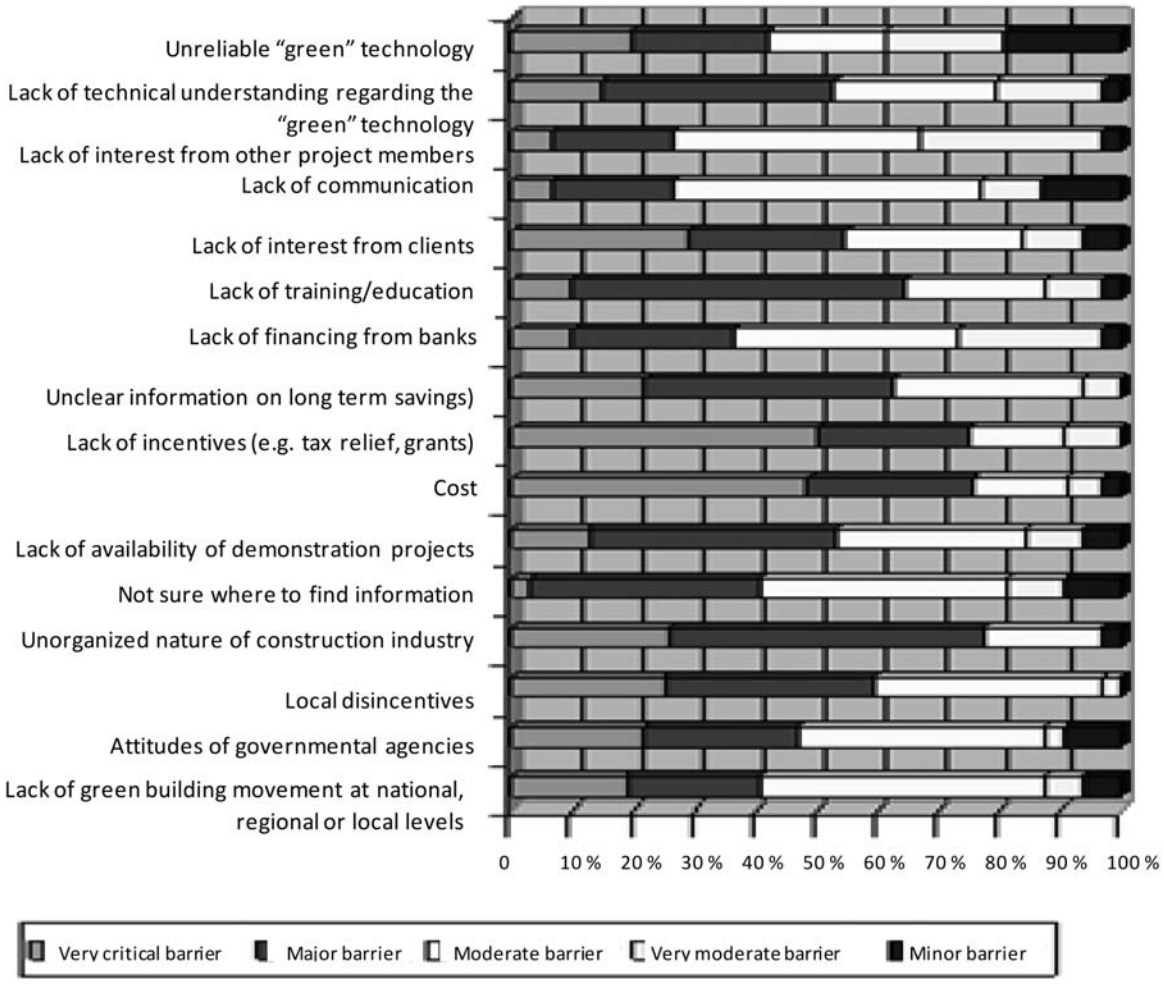


U.S., government has played a role of an "innovator" according to this theory initiating the adoption of LEED® v.1.0 (BDC 2003, DOI 2003). The number of local and state governments and federal agencies adopting LEED® standards is growing rapidly including the State of Michigan, the City of Chicago, and the U.S. Army.

In response to the question within the study survey to classify adopter organizations in the five categories of "diffusion of innovation," most of the respondents agreed that:

- Architects, engineers, sustainable building consultants, multinational corporations, large business houses and the environmental groups were the innovators in India;
- NGO's, and the media were among the early adopters;
- Professional associations, trade organizations, universities, educational institutions community groups, owners, developers and celebrities were among the early majority;
- Federal, state and local governments, suppliers and manufacturers were the late majority of adopters;
- Political leaders, general contractors, and municipalities were identified as laggards.

FIGURE 7. Barriers that prevent the adoption of green building guidelines in India.



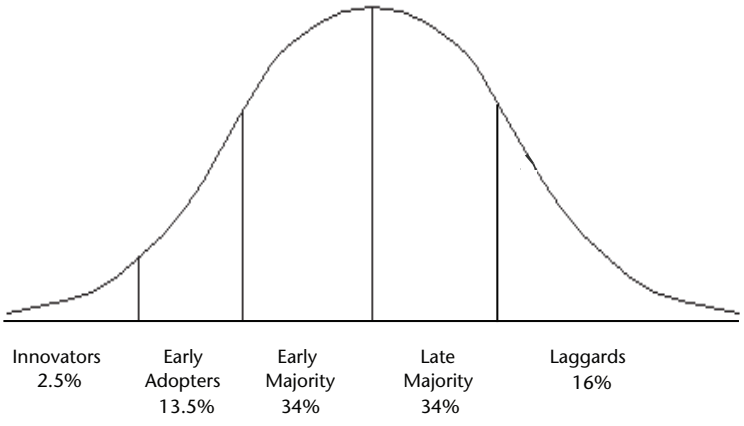
DISCUSSION

Based on the findings of the critical analysis of the literature and survey implementation, two aspects related to the adoption of green building guidelines in a society will be discussed in this paper. First, based on the characteristics identified earlier, a set of recommendations to help with the adoption is presented. Second, based on the survey conducted in India, an implementation strategy is proposed.

Recommendations on Adoption of Green Building Guidelines

As discussed in earlier sections, addressing the attributes of a green building guideline regarding complexity, compatibility, trialability, observability, competitive advantage, availability of information, flexibility, adaptability, and cost are essential for its acceptance in society. The following recommendations can catalyze the adoption of these guidelines. These recommendations are based on the detailed review of the green building guidelines, existing literature, and the research team's previous research in green buildings (Bunz 2006, BRE 2007, Bondareva 2005, Cheng 2007, Dalal-Clayton et al. 1994, Grace 2007, GBI 2007, HK-BEAM 2007, JSBC 2007, Korkmaz et al. 2009, Landman 1999, Melchert 2005, Potbhare and Syal 2008, Potbhare et al. 2009, USGBC 2008):

FIGURE 8. Categories in "Diffusion of Innovation.



- An ideal green building guideline should be easily understood and adopted by the grass root levels of the society. It should not be made in isolation at the national level and should be flexible as well as acknowledge local differences.
- It should be multi-sectoral and integrative, aiming toward the relevant interest and overcoming the institutional as well as policy fragmentations. A green building guideline should encourage the widest possible participation beyond the project related professionals, including the government as well as non-governmental agencies, religious groups, community groups, trade unions, social interests, environmental organizations, resource users, academics and professional institutions, schools and teachers, banking and financial institutions, media, judiciary, individual members of the public as well as international organizations.
- It should consider and incorporate the environment–economy–society linkages. As the green building guideline requires user participation at diverse levels, it should be framed in a manner that addresses sharply differing opinions and divergent attitudes to the environment–economy–societal relationships.
- The implementation of a green building guideline should be accompanied by an equal amount of effort in the field of capacity building. This effort should be organized to enhance institutional arrangements, sharpen concepts and tools, foster professional skills as well as improve public environmental awareness.

Implementation Strategy

The implementation strategy proposed in this section is based on the understanding of the societal attributes associated with the adoption of green building guidelines, the research team's work with green buildings in the U.S. and India, and the analysis of the responses to the survey conducted in India. A similar methodology can be adopted to frame an implementation strategy for any developing country by collecting contextual information of its societal attributes.

The primary aim of the implementation strategy presented is to accelerate the adoption of green building guidelines in the developing countries by motivating the potential adopters to accept these guidelines. As shown in Figure 9, the current adopters of green building guidelines in India represent a very small group and can be identified as "innovators" according to the theory of "Diffusion of Innovation". The circles shown in the dotted lines are the potential adopters of these guidelines representing the "early adopters" and the "early majority" in Indian society. This research focuses on motivating the potential adopters in these two categories to incorporate green building guidelines by solving the barriers faced by them as well as incentivizing them for the adoption of these guidelines. Based on this understanding, the implementation strategy can be divided in three phases: (1) the organizations that accelerate the adoption of green building guidelines in the society are identified based on the theory of "Diffusion of Innovation"; (2) the incentives as well as the barriers associated with the green building

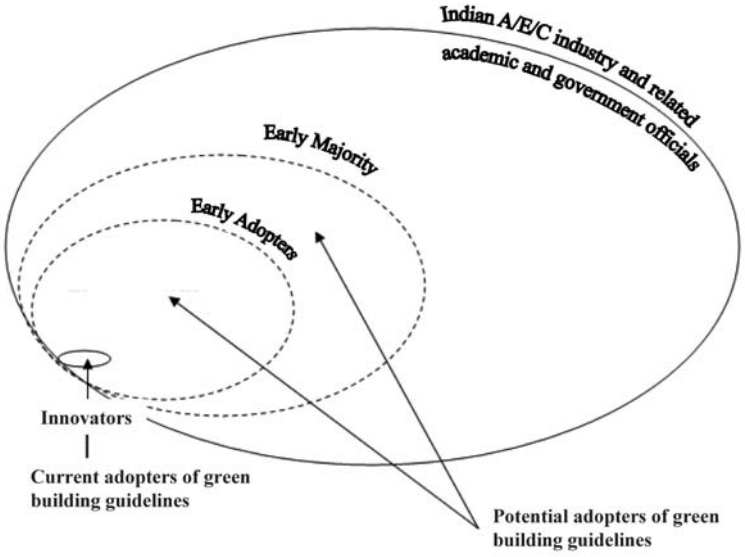


FIGURE 9. Adoption levels of green building guidelines by the society.

guidelines are identified; and (3) the motivations necessary for the adopter organizations to adopt green building guidelines are identified. Also the information sources through which these motivations can be communicated are identified in this phase.

Phase I: Identification of the adopter organizations In this phase the organizations in India that will initiate as well as catalyze the process of adoption of green building guidelines are identified. These organizations are further classified into five categories based on the theory of "Diffusion of Innovation". Recommendations in the form of a strategy are made to focus on certain adopter organizations to catalyze the process of adoption of these guidelines in India.

- The respondents to the questionnaire identified architects, engineers, sustainable building consultants and the environmental groups as "innovators" as per the "Diffusion of Innovation" theory. "Innovators" are venturesome, daring, have an ability to understand and apply complex technical knowledge (DOI 2003, Rogers 2003). These characteristics of "innovators" correspond to the characteristics of the adopter organizations as identified by the respondents in context of green building guidelines in India. To catalyze the adoption of these guidelines in India, it is necessary to incentivize these "innovators" as they can initiate the adoption of green building guidelines in the society.
- The "early adopters" as identified by the respondents of the questionnaire were multinational corporations, large businesses, NGO's, community groups, owners, developers, celebrities and media. The characteristics of the "early adopters" are (DOI 2003, Rogers 2003): opinion leaders in their fields, role models for the other members of the society, successful, and respected by their peers.
- It is important to incentivize the "early adopters" as they play a role of opinion leadership in the society. In India, if the large business houses, multinational organizations, celebrities and media who are identified as "early adopters", endorse green building guidelines, it can accelerate the adoption of these guidelines.
- The organizations identified as the "early majority" are the professional associations, trade organizations, universities and educational institutions. The characteristics of this group, as defined by the "Diffusion of Innovation" theory, are that they interact frequently with peers and are conscious about the results before adopting any new idea (DOI 2003, Rogers 2003). By the time all "early adopters" adopt a new innovation; its market share reaches 50% of the society

(Rogers 2003). It is therefore, very essential to incentivize the "early majority" organizations as they are the largest population of adopters for any developing country.

- Groups at lower levels than the "early majority" level of adoption of green building guidelines can be affected by peer pressure or the fear of being left out (DOI 2003, Rogers 2003). The "Diffusion of Innovation" theory defines those groups in the two categories "late majority" and "laggards" which comprise the other 50% of the population. The adopter organizations identified for these categories are federal and state governments, suppliers and manufacturers in "late majority" category and political leaders, municipalities and general contractors in the "laggards" category (DOI 2003). These organizations will adopt green building guidelines after they have become a necessity in the society. They should be less prioritized as compared to other adopter organizations as they will not adopt these guidelines unless most of the society has adopted them.

Phase II: Identification of incentives and barriers Table 4 shows "very important" and "important" incentives identified by the respondents that are essential to catalyze the adoption of green building guidelines in the Indian society.

These incentives should be prioritized among other incentives that can be given to the potential adopters of the green building guidelines in India to catalyze their process of adoption. To further ensure the sustained rapid acceptance of these guidelines, the barriers associated with the green building guidelines should be removed. The barriers identified by the current adopters of green building guidelines are as shown in Table 5.

Most of these barriers are linked to the lack of availability of information on green building guidelines related to the long-term cost savings, benefits associated with health and productivity, energy and material conservation, etc. These barriers can be addressed if the incentives discussed in Table 4, are given to the potential adopters of green building guidelines. There should be a special effort by the Indian Green Building Council to resolve these

TABLE 4. Incentives needed to catalyze the adoption of green building guidelines in India.

Level	Incentives
Very important	Availability of better information on cost and benefits of green building guidelines
Important	Availability of the institutional framework for effective implementation of green building guidelines
	Educational programs for developers, constructors, policy makers related to green building guidelines
	The creation of environmental awareness by workshops, seminars and conferences

TABLE 5. Barriers associated with the adoption of green building guidelines in India.

Level	Barriers
Very critical barrier	Cost of building "green"
	Lack of incentives in the form of tax reliefs and grants.
	Unorganized nature of Indian construction industry
Major barriers	Unclear information on recovery of long term savings
	Local disincentives such as lack of choices among the "green" products, lack of trained work force, etc.
Moderate barriers	Lack of "green" movement (or environmental awareness) at the local, regional and national level.
	Unreliable "green" technology

barriers and give more incentives to motivate the potential adopters.

Phase III: Identification of motivation factors and information sources In this phase the motivations that can lead an adopter organization to incorporate the green building guidelines into their projects are discussed. It is assumed that a potential adopter will look for information related to incentives and barriers associated with the adoption only if he/she is motivated to adopt these guidelines. Since the "innovators", "early adopters" and "early majority" are among the initial organizations to adopt green building guidelines, it is necessary to motivate them. Table 6 shows the individual's and organization's motivations as identified by the respondents in the questionnaire.

The "innovators" or "early adopters" organizations identified in this research such as architectural or engineering firms, large businesses, multinational corporations, celebrities and media can be motivated to demonstrate their environmentally friendly behavior or to gain the publicity value associated with the adoption. An informed approach to motivate these adopter organizations can further catalyze the acceptance of green building guidelines in the Indian society.

It is necessary to promote the benefits associated with the adoption of green building guidelines in the society as well as publicize the current adopters of these guidelines. This can be done through: workshops and seminars, periodicals and magazines, courses, internet, and books.

SUMMARY

This research presented strategies for the adoption of green building guidelines in India and other countries with similar circumstances. Factors that can catalyze the adoption of green building guidelines are identified as clarity and adaptability by the different layers of the society and all sectors, its strength in addressing the environment–economy–society linkages, and support at the government, public, and the industry levels. This research also presents the classification of the societal attributes and frames a survey questionnaire based on the understanding of these attributes. The implementation strategy proposed is based on the analysis of the responses to the survey questionnaire that identified: (1) the organizations that accelerate the adoption of green building guidelines in the society; (2) the incentives and barriers associated with the green building guidelines; and (3) the necessary motivations for the adopter organizations of green building guidelines. It can be summarized that an informed approach based on recommendations and implementation strategy might potentially contribute to the acceleration of the green building guidelines' adoption in a society, especially in developing countries that are in the process of adopting green building guidelines (e.g. India, China, Turkey, and South American countries). It is the sincere hope of the authors that the work presented in this research will provide a starting point for the onset of sustainable practices in the design and construction sectors of India and other countries with similar circumstances.

ACKNOWLEDGEMENT

This research is sponsored by the Global and Area Thematic Initiative (GATI) at Michigan State University. Funding for GATI is provided by the U.S. Department of Education through MSU's Title VI-funded National Resource Centers including: the African Studies Center, Asian Studies Center,

TABLE 6. Individual's and organization's motivation to adopt green building guidelines.

Motivations	Individual	Organization
Very important	Social conscience	Company policy
	To demonstrate environmentally friendly practices	
Important	Publicity value	To gain market advantage
	Profit and economic reasons	
	Experimentation	
	To be in forefront	

Center for Advanced Study of International Development (CASID), and Women and International Development Program (WID) as well as the Center for Latin American and Caribbean Studies and the Office of the Dean of International Studies and Programs with support from the Office of the Provost.

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