Development of A Rating Tool for Implementing Green Construction Practices in Saudi Arabia

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The Statement of problem

- There is limited research on green buildings in Saudi Arabia.
- There is limited information regarding the factors that effecting the adoption of Green Practices (GPs) in Saudi Arabia.
- We do not have a region-specific rating assessment tool for certifying green buildings.

Objectives of the Research

In this research, there are three main objectives:

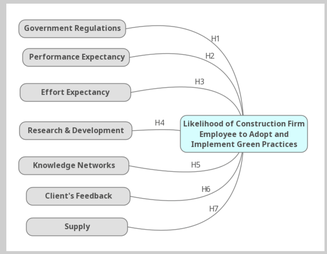
- identifying the factors influencing a construction firm's professional's decision to adopt sustainable and green practices in Saudi Arabia,
- determining dominant themes surrounding the debate over the adoption of sustainable and green practices in Saudi Arabia,
- proposing a new rating assessment tool for green buildings in Saudi Arabia.

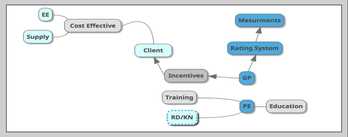
Background

Green Construction, including the implementation of sustainable and green building practices, is one solution to protecting environmental resources. Green practices (GP) in the construction industry involve using more efficient energy, water, land, and material products, and services. Statistically, adoption or implementation of green practices in Saudi Arabia is rare and hard to verify. This is due to the nascent nature of green buildings in the construction sectors of such emerging economies.

Methods

- Mixed Method : Quantitative & Qualitative
- *Quantitative* to get the big picture of the factors that effecting the GPs adoption
- 85% of respondents were males
- 32% of respondents' education level is BA/BS
- 40% of respondents' education level is MS
- 27% of respondents' education level Ph.D.
- 27% of respondents have 1-5 years of work experience in the construction field
- 31% 20+ of respondents have years of work experience in the construction field
- 60% are aged 44 or younger
- *Qualitative* to go deeper on the factors
- Government pressure is directly related to a green rating system.
- Government provides incentives for clients.
- Government provides funding and education for GPs.





Findings

Existing Major Rating Systems:

- **BREEAM**
- **LEED**
- **Green Globes**
- **Green Star**
- **The German Building Sustainable Certificate (DGNB)**
- **BREEAM Gulf**

A Rating System for Saudi Arabia: Green Crescent

Category	Points
Water Availability and Accessibility (25)	
Outdoor Water Use Reduction	(4)
Indoor Water Use Reduction	(4)
Building Water Metering	(5)
Cooling Tower Water Use	(2)
Boilers and Water Heaters	(2)
Water Treatment	(2)
Alternate Water Sources	(2)
Irrigation	(2)
Shortage of Water Plan	(2)
Energy/Atmosphere (15)	
Performance Optimization	(3)
Robust Commissioning	(2)
Building Energy Metering	(2)
Demand	(2)
HVAC	(2)
Energy Efficient Transit	(2)
Alternate Energy	(2)
Sustainable Sites (5)	
Natural Disasters Plan	(1)
Ecological Impact	(1)
Development Site	(1)
Landscaping	(1)
Geographic Proximity to Hubs	(1)
Emissions/Pollution (10)	
Heating	(2)
Cooling	(2)
Janitorial Equipment	(2)
Pollutants' detectors	(4)

Category	Points
Materials/Waste Management (15)	
Renewable Energy Application	(3)
Re-use of construction waste	(3)
Waste Management Plan	(3)
Storage and collection of recycles	(3)
Life Cycle Impact Reduction	(3)
Indoor Environmental Quality (10)	
Daylight	(2)
Interior Lighting	(2)
High IAQ Performance	(2)
Pollutants' Measurement	(2)
Thermal and Acoustic Comfort	(2)
Socio-economic well-being (10)	
Convince	(2)
Social Integration Plan	(2)
Provision of labor for locals	(2)
Purchase of locally made goods/services	(4)
Socio-economic well-being (10)	
Convince	(2)
Social Integration Plan	(2)
Provision of labor for locals	(2)
Purchase of locally made goods/services	(4)
Project Management and Planning (10)	
Integrated Design Process	(2)
Environmental Management Plan	(2)
Lean Management	(2)
Innovation	(4)

Discussion

- A new rating tool should be developed considering government pressure, performance expectancy, measured largely by the cost-effective nature of products.
- clients' pressure appeared to be the strongest predictors in explaining the odds of construction firms' managers and employees to adopt GPs.
- Table presents the findings of the Multiple Regression Analysis.
- All proposed hypotheses by this research are supported except the hypothesized effect associated with Knowledge Networks.

Variable	Hypothesis	Result
Government Regulations	The presence of government mandates and coders encouraging green buildings increases a construction firm's likelihood of adopting green practices.	Supported
Performance Expectancy	Higher perceived performance expectancy associated with green practices among construction firm employees is positively associated with the likelihood of green practices adoption.	Supported
Effort Expectancy	The easier green practices to learn and adopt, the more likely they will be adopted by construction firms.	Supported
Research and Development	The more construction firms invest in green building research and development, the more they are likely to adopt green practices.	Supported
Knowledge Networks	The more frequent and enriched knowledge networks are within construction firms, the higher the likelihood construction firms will adopt green practices.	Not Supported
Clients' Feedback	The more frequent and intensely clients demand the implementation of green practices in a project, the higher the likelihood of construction firms adopting green practices will be.	Supported
Supply	The higher access to green product supplies that construction firms have, the more likely they will adopt green practices.	Supported

Recommendations

- More funding by the government to non-governmental organizations such as the Green Building Council of Saudi Arabia.
- Adopt the Green Crescent rating tool as a construction model and standardize green construction.
- The government should also provide certification programs.
- The universities should add green construction courses to their programs.

Conclusion

1. There is no green rating tool in Saudi Arabia.
2. Therefore, we develop The green crescent .
3. The quantitative and qualitative phases found that Government presser is one of the most important factor.

Future Directions

- Future research Use of random sampling
- The use of non survey variables