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Contribution of Knowledge in Sustainable Building Design in Emerging Markets – A Case of Vietnam

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Agenda



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Agenda

- Background
- Related Work and Hypothesis
- Research Methodology and Findings
- Discussion and Future Research



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Background



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Background

- Sustainable building (SB) practices have attracted significant interest in developing countries (Hassan et al., 2016).
 - The needs for a continuous growth in economy.
- The SB practices are underdeveloped in developing countries as compared with developed countries.
 - Regular (i.e., uncertified) buildings remain dominant in the market.
- Construction industry remains a major contributor to greenhouse gas emissions and other environmental pollutants in developing countries (Kientzel and Kok, 2011).



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Background (cont'd)

- Rich literature on SB practices; yet, most of them focused on:
 - Green buildings (GB)
 - Developed countries
 - Improvement on the “hard side” of the construction practices (i.e., construction processes and materials)
- There is a lack of research from a social-psychological perspective.
 - How construction practitioners’ characteristics (i.e., their GB-related knowledge and project roles) may influence the implementation of SB practices in regular buildings in developing countries (i.e., Vietnam)?



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Related Work and Hypothesis



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Related Work

- Practitioner-related enablers for the adoption of SB practices (Aktas and Ozorhon, 2015; Li et al., 2014; Mollaoglu et al., 2016; Ofori and Kien, 2004; Swarup et al., 2011).
 - Project owners' sustainability commitment
 - Clients and market conditions
 - Top management's support,
 - The designers' supports (e.g., architects' early inclusion of green strategies in their designs)
 - Project managers' competence and project team members' GB-related experience and knowledge
 - The collaboration among project parties
 - Constructors' early involvement



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Related Work (cont'd)

- Practitioner-related “barriers” for the adoption of SB practices (AISanad, 2015; Hwang and Tan, 2012; Kang et al., 2013; Pietrosevoli and Monroy, 2013; Shari and Soebarto, 2014; Zhang et al. 2010)
 - Project participants’ lack of relevant knowledge
 - Common misperceptions about GB (e.g., high cost and technical complexity and challenges)
 - Lack of interest and communication amongst team members
 - Low interests from clients and market
- Prior studies support the effect of participants’ GB-related knowledge and project roles on SB practices. Yet:
 - Lacking empirical evidence;
 - Unclear how participants’ roles (e.g., project owner, project manager and team members) may moderate the relationship



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Hypothesis

- *Hypothesis 1 (H1):* Participants' GB-related knowledge (GBKn) is positively related to the application of sustainable practices in a regular building project.
- *Hypothesis 2 (H2):* Participants' roles (i.e., owners, designers, constructors) moderate the relationships between their GB-related knowledge and the application of sustainable practices in a regular building project.



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Research Methodology and Findings



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Research Methodology

- A questionnaire survey with industry practitioners in Vietnam (i.e., 240/850 surveys with 204 valid samples)
- Unit of analysis and questionnaire: “a building project”; (1) rate the degree of application of various SB practices in their selected projects; (2) report their demographic information (e.g., project roles, years of experience, and GB-related knowledge).
- Measures: A total of 39 SB practices derived from the GB criteria listed in LOTUS (i.e., a local GB rating system in Vietnam).
 - 6 items in energy (E), 5 in adaptation and mitigation (A), 4 in water (W), 4 in materials (M), 4 in ecology (Eco), 4 in waste and pollution (WP), 4 in health and comfort (H), 4 in community (CY), and 4 in management (Man).
 - Rate “the degree that each practice was implemented in their selected project” on a 5-point scale (1: “not at all”; 2 = “small degree”; 3 = “moderate degree”; 4 = “high degree”; 5 = “very high degree”)



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Findings: Characteristics of Respondents

Description	Frequency	Percent
<i>Surveyed projects:</i>		
Regular building (non-certified)	169	82.8
Certified green building (LOTUS, LEED, etc.)	35	17.2
<i>Role in the surveyed project:</i>		
Owner representatives (owner and PM consultants)	51	25.0
Designers (architects, engineering designers)	75	36.8
Constructors (contractors, construction managers)	75	36.8
Others	3	1.5
<i>Years of professional experience:</i>		
3-5 years	97	47.5
6-10 years	70	34.3
11-15 years	21	10.3
16 years or more	16	7.8
<i>Prior experience in certified green building project(s):</i>		
No	157	77.0
Yes	47	23.0
<i>Knowledge of at least one green building rating system:</i>		
Not familiar	71	34.8
Somewhat familiar	39	19.1
Familiar	94	46.1

Findings: Applications of Sustainable Building Practices

- A much higher level of adoption of all sustainable practices among certified GBs as compared with regular buildings.

Sustainable building practice	Regular building		Certified GB	
	Mean	SD	Mean	SD
Energy (E)	2.86	0.61	3.40	0.70
Water (W)	2.51	0.79	3.12	0.83
Materials (M)	2.42	0.75	3.30	0.73
Ecology (Eco)	2.59	0.74	3.24	0.71
Waste and Pollution (WP)	2.44	0.71	3.44	0.82
Health and Comfort (H)	2.90	0.75	3.70	0.71
Adaptation and Mitigation (A)	3.00	0.70	3.65	0.61
Community (CY)	2.89	0.72	3.57	0.56
Management (Man)	2.83	0.72	3.63	0.66
Overall (AllGB)	2.73	0.56	3.46	0.52

Findings: Effect of Knowledge in Sustainable Design of Regular Buildings

- Based on the analysis of 166 valid surveys focusing on regular buildings.
- **H1 is supported:** GB-related knowledge is positively related with sustainable construction practices.

Category	All roles	Owner representatives	Designers	Constructors
Energy	√	√+		
Water	√	√+		
Materials	√+	√+	√-	√-
Ecology	√+	√+		
Waste and pollution	√+	√+		√
Health and comfort	√+	√+	√-	
Adaptation and mitigation	√+	√+	√-	√
Community	√-	√+		
Management	√+	√+		√
Overall	√+	√+		√-

Significance level of 0.1 (√-); 0.05(√); and 0.01 (√+)



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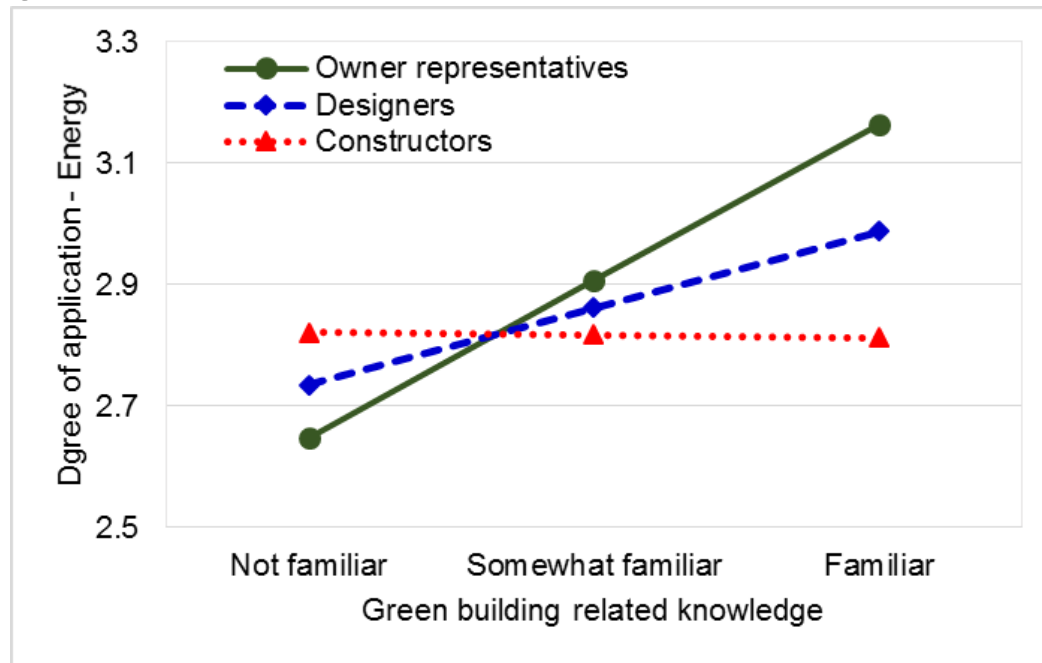


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Findings: Effect of Knowledge in Sustainable Design of Regular Buildings

- **H2 is generally supported:** Participants' project roles moderate the effect between their GB-related knowledge and SB practices (except for "Management" category)
 - The effect is most significant for owner representatives, followed by designers and constructors.



Discussion and Future Research



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Discussion and Future Research

- Research findings confirm the positive effect of GB-related knowledge on SB practices; particularly among owner representatives.
 - The need to provide appropriate training to project participants to advance SB practices in fast-growing emerging economies like Vietnam.
 - In cases where resources for GB training are limited, the priority should be given to the training programs targeting at project owners (and/or their representatives).
- Future research may focus on other the effect of other social-psychological variables (e.g., participants' industry experience and prior experience with GB) on SB practices.



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