
Mapping of Sustainability in Architectural Practices in the Philippines

Géza Fischl¹
geza.fischl@me.com

Gloria B. Teodoro²
gbteodoro@mapua.edu.ph

Abstract

The awareness in architectural sustainability is increasing worldwide. This pilot study aims to map and evaluate the situation of sustainable development of architecture offices in the Philippines through an online survey. In spite of sampling difficulties, the mapping of sustainability was successfully done for the collected sample, and results showed that architects evaluate themselves as having less than intermediate level of knowledge/skill in sustainability issues. Furthermore, they have a general concept about natural (renewable), energy efficient and sustainable products and services. Difficulties with application of sustainability are due to a client's budget and will. It is widely accepted that the individual companies suffer from lack of resources and therefore perform weaker in sustainability than the profession would require. Introduction of the morphological analysis of sustainable development (morph-SD) tool indicated that architects are mainly familiar with environmental related principle-level sustainability-oriented terms, while the economic and social aspects of sustainable development are not significantly represented. Confirmation of findings and further development of the morph-SD tool would require a comprehensive geographic sampling.

Keywords: architecture practice, sustainable development, semantic analysis

I. Introduction

Over the years, it has become palpable that sustainable design imposes new demands on architects and planners to broaden their expertise to embrace environmental engineering, ecological ways of construction, efficient infrastructure, and unique urban development projects (SAR, 2010). It has also become clear that characteristics like how a building's spatial hierarchy is organized, or day lighting, or design effects on indoor climate and energy performances are all important architectural considerations. The building method, materials and construction technology predetermine the carbon footprint of the building and its life cycle. The use of urban space is associated with land efficiency, therefore balance between the area of agricultural claims, local climate and livable space minimum is essential. Infrastructure as a whole requires optimization in efficiency and a decrease in waste production.

A common way to understand sustainable development is as a process or evolution, in which the development of any social, economic and environmental elements meets the needs of the present without compromising the ability of future generations to meet their own needs (Brundtland, et.al., 1987). The Brundtland's Commission introduced this principle for the World Commission on Environment and Development in 1987 (Brundtland, et.al., 1987). Furthermore, professional bodies acknowledge that sustainable development has implications in the interaction between professionals and society. This is particularly the case for the built environment professions, such that buildings have major environmental, economic and social impacts (Colantonio, et. al., 2008).

To exemplify, buildings are major emitters of carbon, which contribute to global warming. In a report by the Building Research Establishment (2003), the combined energy used in constructing, occupying and operating buildings would account for 50 percent of carbon emissions in the UK. In another report by United Nations Environment Programme (UNEP), "buildings are responsible for more than 40 percent of global energy used, and as much as one third of global greenhouse gas emissions, both in developed and developing countries" (UNEP, 2009, p.8). From a global perspective, the built environment becomes a major

¹ Géza Fischl is a registered architect in Sweden. He holds a PhD in Engineering Psychology and has been researching on restoration supportive environments. Currently, he is a visiting professor at Mapua Institute of Technology. He teaches within the Environmental psychology specialization track for Master of Science in Architecture.

² Gloria Teodoro is both a licensed architect and environmental planner. She is the current dean of Mapua Institute of Technology School of Architecture Industrial Design and the Built Environment. She is currently finishing her PhD in Urban and Regional Planning in the University of the Philippines.

contributor to global environmental issues with great impacts on nature.

Several building performance models are capable to predict the energy performance of a building. The most well-known systems are BREEAM (Building Research Establishment's Environmental Assessment Method), LEED (Leadership in Energy and Environmental Design), and Green Building. The Swedish Environmental Protection Agency argues that to combat climate change, national climate policies must be developed in correlation with international climate agreements. According to Pérez-Lombard, Ortiz and Pout (2008), buildings in developed countries contribute between 20-40 percent of the total energy consumption, which has exceeded other major sectors such as industry and transportation.

Much of the work on sustainability can be described through three key approaches. The first approach is concerned with definitions of sustainability. The second approach is more reductive, with the focus on establishing what is unsustainable, how to make practices more sustainable and how to evaluate sustainable outcomes. This approach operates with checklists, indicators, triple bottom-line accounting and ecological footprints (Wackernagel & Rees, 1996). It is based on the premise that there is sufficient knowledge about the planet and people (e.g. Redclift, 1996). The third approach discusses sustainability as a dialogue – a way of defining and controlling the agenda for change and development (e.g. Sandilands, 1996).

In the Philippines, which is one of the most densely populated countries and is prone to floods, typhoons and disasters, architects are demanding for greater emphasis on sustainable architecture. Architect Edgar Reformado, past chairman of Green Architecture Advocacy of the Philippines (GAAP), stated in a media (Crowcroft, 2010) that the pressing problem of climate change demands changes even in structural design: *"In this era of climate change, every nation has to make the environment a top agenda in governance to ensure a sustainable future. In the architectural field, we are doing efforts to pursue a green agenda (sic) in our construction and design roadmap"*. He also added that the country will benefit from green architecture due to reduced energy consumption and reduced carbon emissions from urban centers: *"By adopting green practices in energy management, building owners will get a higher bottom-line and at the same time help in making the environment cleaner. It will also enhance the occupant's comfort and health"*. Miguel Guerrero, the current chairman of GAAP (Crowcroft, 2010), described green architecture as *"designing according to what is around you...ecological and aesthetic harmony"* and it should focus on the *"3 Rs: Reduce, Reuse and Recycle, with urban planning promoting energy and water efficiency and environmental protection, among others"*.

In an article by Glavic and Lukman (2007), high importance was given to sustainability-oriented terms in order to classify definitions in clarifying ambiguity and for examining the connection between the domain of social, economical and environmental considerations. Their pyramid of sustainability development model is an evolutionary, self-improving concept that advances over time. The levels of sustainability development are

entailing principles, approaches, sub-systems and on top, policy. Among these levels, forty-two sustainability-oriented terms were tested and located for better understanding of each concept and location. As an example by Guerrero, the 3 Rs would be located on principles level that is the lowest consideration in sustainable development.

Having reviewed some of the issues for sustainable development and architecture, the aim of this pilot study was to map the existing situation of sustainable development of the architectural profession within the Philippines. Furthermore, it was aimed to investigate the level of awareness of sustainable development through semantic differentiation.

II. Method

A. Participants

The project was initially aimed to recruit members of the United Architects of the Philippines (UAP). However, permission was not granted to conduct a survey among the members and the reason for this stayed unclear. An alternative sampling method was therefore used. The second attempt in involving architects within Metro Manila was a Google based email address search, wherein only validated addresses were collected. In this way, there were 45 email addresses gathered to which an online questionnaire was sent out on March 7, 2014 using a system that creates, sends and tracks newsletters. Out of 45 addresses, 15 (37.5 percent) had opened the email and only one (2.5 percent) clicked on the link. Furthermore, five emails bounced back and one unsubscribed from the list. When a reminder letter was sent out to the list of 39 addresses on April 1, 2014, the opening rate became 16 (42.1 percent) and five has clicked to the questionnaire. Yet, two addresses bounced back and in spite of all effort, no one had completed the questionnaire using this distribution technique.

Finally, a purposive sampling method was used, employing personal networks of the School of Architecture, Industrial Design and the Built Environment at Mapúa Institute of Technology. Among the 12 participants the mean age was 42.12 years (SD=12.28) and seven (58 percent) of them were male.

B. Data Collection Instrument

The online questionnaire started with informed consent, and then this pilot questionnaire was divided into three main parts. In the first, participants were asked demographic questions, such as age, gender and work related demographic questions (year of employment, positions and ranks within the company, the level of skills/qualification for natural or renewable, energy efficient and sustainable considerations, and memberships in professional organizations). The second part was designed to measure the general knowledge of the field of investigation. Concepts about a natural (renewable), energy efficient and sustainable product and service were collected. Relevance of these concepts regarding company

and professional perspectives was rated on a seven-point Likert-scale. The third part of the questionnaire on organizational know-how included open-ended questions on driving forces, tools and exchange possibilities for natural (renewable), energy efficient and sustainable services and products in both companies and profession. Furthermore, the degree of relevance (seven-point Likert-scale) for considering healthy buildings and the natural (renewable), energy efficient and sustainable theme was asked. Questions also included level and form of engagement with clients on natural (renewable), energy efficient and sustainable issues. Finally, a library of sustainability-oriented terms was tested for engagement with clients. These terms were borrowed from Glavic and Lukman (2007) in the discussion of the rapid increase in awareness of sustainability. These terms were borrowed from Glavic and were rated on a seven-point Likert-scale. In their work, altogether there were forty-two (42) sustainability-oriented terms investigated and located into an equilateral triangular pyramid (regular tetrahedron) space, which represent the economic, social and technological aspects of sustainability on the base, while sustainable policy on the apex. In their model, sustainable development is seen on a time domain, which necessitates continuous development in all four aspects (base and apex) of sustainability. This pilot research treated these sustainability-oriented terms on a nominal scale, mainly for the indication of whether or not these terms are used in an architect-client interaction.

C. Analysis

The analysis entails both qualitative and quantitative data interpretations. The open-ended questions are intended to develop a theme or describe awareness level of a natural (renewable), energy efficient and sustainable concept that emerges through the synthesis of answers. The qualitative data for the Likert-scale is treated with non-parametric statistical test (Wilcoxon Signed Rank test) for considering one population sample and variable while the nominal data is analyzed through Chi-square goodness-of-fit test. The statistical tests were performed by *psppire* 0.8.4. Due to the limited number, representative sample of participants, both quantitative and qualitative data, has limitation in terms of generalizability.

III. Results

The results of this pilot study were gathered by an online questionnaire that employed both qualitative and quantitative analyses. Initially, the overall aim was to map sustainability practices in the Philippines and provide enough data to look into the variations of sustainability practices. However, the amount of data gathered was insufficient to conceive general conclusions valid for the whole architectural profession, yet it was appropriate for a locally representative pilot study.

Results of the first part show that participants rated their own skills/qualifications for natural (renewable), energy efficient and sustainable consideration as closer to intermediate ($M=1.67$; $SD=0.65$) on a three-point scale

where novice (1), intermediate (2) and expert (3) levels were differentiated with an explained categorization. They were in the profession for $M=18.5$ years ($SD=11.37$) in average and only two of them were members of any green architecture organization in the Philippines. While most of the participants are stakeholders in their company (58 percent) it was also shown that this level was attained after at least seven years in profession.

The second part gathered results of the general knowledge in the field of sustainability. These open-ended questions were composed into sentences, because individuals did not provide an extensive response for each question. In this way, it was reasonable to illustrate the level of concerns in terms of architectural sustainability among the stakeholders. Hence, participants have explained natural or renewable resource as it is characterized with nature relatedness and the ability to be replenished indefinitely that does not necessitate carbon footprint in production. Additionally, in their answers, these resources could be of "wind, ethyl, methanol, hydro and solar" and at the same time energy efficiency was characterized as an energy saving technology to produce the same product or service with "less cost, less energy and in a larger amount". For the question on what do healthy buildings mean, participants related to a construction that positively affects operability and livability of a structure from user perspectives and it does not emit hazardous compounds, meanwhile it also excludes them. The concerns in providing natural (renewable), energy efficient and sustainable products and services in the architectural profession are manifested in terms of increased construction costs, extended return of investment, lack of provision for sound utilities and lack of awareness and knowledge from the developer and even from the architecture professionals. Participants rated on how relevant natural (renewable), energy efficient and sustainable consideration within a company and in the profession. On a seven-point Likert-scale (1=Not at all to 7=Very much), architects indicated $M=5.08$ ($SD=2.02$) for company and $M=6.08$ ($SD=1.16$) for the profession. This illustrates that architects considered these questions as more relevant in the professional exchange than in a company.

The third part dealt with questions about organizational know-how for sustainable development. The driving force for natural (renewable), energy efficient and sustainable agenda in companies is mainly manifested in sales and marketing. However, providing well-being, environmentally sound materials, and sustainability services for the clients are mainly based on the architects' self-motivation. The process of a LEED qualification, for instance, is more of an external, rather than internal motivating factor. Dissemination and information exchange venues are mainly concerned with education and awareness of natural (renewable), energy efficient and sustainable products and services. Idealism is one of the main driving forces of the topic, however some professional environmentally-conscious organizations already provide seminars and information exchange for issues on sustainability. A legal approach to minimize energy consumption in buildings ought to be fully implemented.

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Currently, the most important tools and information resources for natural (renewable), energy efficient and sustainable products and services in a company are usually the seminars organized by United Architects of the Philippines as well as brochures and online teaching materials or textbooks on the topic from other sources. There were significant difference found ($Z=-2.04$, $df=10$, $p<.05$) between the two domains (company and profession) for concerns in healthy buildings. Architects answered that the profession ($M=5.5$, $SD=1.78$) is more concerned with health buildings than the companies ($M=3.92$, $SD=1.51$). From an architect's point of view, concerns for healthy buildings among clients are significantly lower ($M=3.58$, $SD=1.44$) than it is for a company.

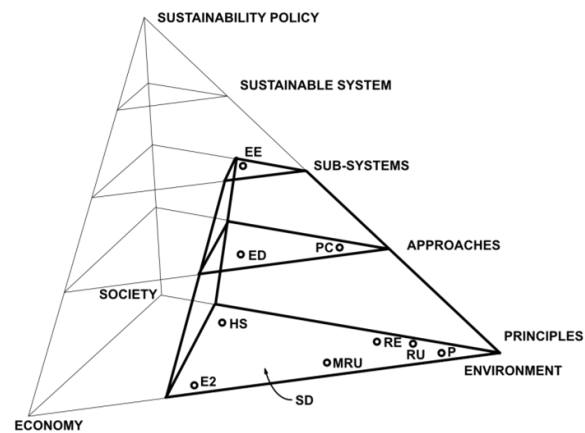
Practitioners may employ energy analysis tools and sustainability assessments, while consultants in the field of sustainability are partly commissioned. The companies have several strategies in exchanging ideas on natural (renewable), energy efficient and sustainable products and services. They can invite foreign experts and discuss sustainability in terms of LEED certification. Weekly exchange of ideas through internal discussion is a common venue for spreading information. Furthermore, design charettes or email communications are also part of the exchange tools among the inquired professionals. Unfortunately, some companies have not been implementing any of these information techniques.

Majority of the architects discovered the lack of company resources in developing a sustainable design on their own. Therefore, the clients may choose the means and the goal for the project being developed in terms of natural (renewable), energy efficient and sustainable considerations. It can happen that during design development, experts are invited for detailed discussions, and according to the participants, most of the clients are introduced to the concept of sustainability through certain products and services. In some cases, even profitability is discussed. However, sustainability is seen as an additional cost in the development in almost all cases. In spite of this, it is frequent that the architect does not introduce the concept of sustainability to clients.

Gap exists in understanding sustainability between architects and engineers in terms of knowledge and its application. While architects focus on new and efficient materials, engineers are working with "what was given to them". The engineering concept can be summarized from an architect's perspective as they "erect structures that has (sic) a shorter life span and easy to demolish for future re-development".

When talking to a client, architects reported the use of some sustainability-oriented terms that are seen as indicators for sustainability performance in practice. The following terms were found to be significant ($\chi^2=5.33$, $df=1$, $p<.05$) while interacting with a client: environmental accounting, eco-design, environmental engineering, eco-efficiency, health and safety, purification, pollution control, recycling, and reuse. In addition to these, two concepts were found to be significant on a higher level ($\chi^2=8.33$, $df=1$, $p<.01$): sustainable development, and minimization of resource usage. The visualization of the

location of sustainability-oriented terms is presented in Figure 1. This is based on Glavic and Lukman's (2007) semantic analysis of sustainability-oriented terms.



- EA, environmental accounting;
- ED, eco-design;
- EE, Environmental engineering;
- E2, eco efficient
- HS, health and safety
- MRU, minimization of resource usage;
- P, purification
- PC, pollution control
- RE, recycling
- RU, reuse
- SD, sustainable development

Figure 1. The morphological visualization of sustainable development (morph-SD) using sustainability-oriented terms within architect-client interaction for engaging natural (renewable), energy efficient and sustainable design. The original figure can be found in Glavic and Lukman (2007).

The sustainability-oriented concepts that are involved in the architect-client interaction in engaging natural (renewable), energy efficient and sustainable design are mainly limited to the principles of sustainability. However, approaches and sub-systems levels are also reached. From an architectural perspective, all these sustainability-oriented terms are positioned closer to the environment domain of sustainability rather than society or economy. The term "sustainable development" is understood here as the total in terms of the pyramid encloses. Therefore, the actual volume that was revealed by this analysis contributes to a limited understanding of sustainable development within the field of architecture, which in turn may be described as porous and more of built environment-oriented.

IV. Discussion

The mapping of architectural practices on sustainability development and performance took place with the help of an online questionnaire involving both qualitative and quantitative analyses. In spite of the limitations, this pilot

study is the first attempt to investigate the whereabouts of sustainability concept and its development in the architectural profession in the Philippines.

By the given sample, architectural practice can be characterized as having a need to increase appropriate information about what is architectural sustainability and how it relates to environmental and socio-economic consequences. Furthermore, the channels of such information gathering can be multi-faceted from informal to formal, which make them important to obtain information from reliable sources. It became apparent that in the sample of architects, they have marginal or even no influence in decision making on sustainable development because economics and short-term developer goals are directing the strategy on sustainability performance. Strengthening the sustainable policy requirements is seen as an important leap for the profession, which could play a positive effect in energy efficiency of architectural projects. An immediate threat to architectural sustainability is actually coming from within the profession and it is concerned with architectural-engineering interface. Architects seem to have different understanding on how sustainability works for engineers and for architects. A critical approach to architectural-engineering and architecture itself would be needed in order to optimize the performance for sustainable development.

Analysis of sustainability-oriented terms revealed that the practicing architects' terminology in the sustainable development theme is mainly environmental in nature and it is deficient in economic and social considerations. There is a lack of sustainability-related principles, approaches and sub-systems applied in the present practices of architecture among the surveyed respondents. Therefore, it would be beneficial to develop and disseminate applied knowledge among these professionals. Architects who mastered the language of sociology and economics might have a successful approach in managing various sustainable architectural developments.

The shape of the morphological analysis of sustainable development (morph-SD) is a suitable visualization method in the current position of terminology used within architecture. This morphology of development is a novel approach to map and visualize development in the profession. It has the potential to be an excellent descriptive tool for the intended purpose. It also considers the time issue and evolutionary concept as the original authors of the model suggested in their pyramid. The fundamental difference is that this proposed morph-SD tool incorporates a morphological evaluation technique that is visual and accurate in applying repeated measures for sustainable development in a certain profession, the evolution of the visualized form develops a series of morphs. When newer sustainability oriented terms are initiated and located within the pyramid of environment, social, economic and the political, the fine-tuning of this morph-SD tool could be established.

V. Conclusion and Recommendations

Originally, the intention with this study was to map sustainability development in a large sample of architects. The study faced several drawbacks mainly due to sampling difficulties. However, this limitation did not prove to be as negative as it was estimated. To the contrary, a conceptual understanding of the architectural profession on sustainability development could still be derived as it was detailed in the results section. Furthermore, this paper is introducing a novel approach to measure and visualize the morph of sustainable development through semantic differentiation. Future investigations may develop the morph-SD tool as a reliable method through a larger sample study including other geographic areas.

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