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ENGAGE THE PUBLIC IN CONVERSATION

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MUHON is a forum for discussion of ideas on the designed environment published by the College of Architecture of the University of the Philippines in Diliman. This publication seeks original work and welcomes contributions related to a variety of issue areas. All submitted works should not have been previously published.

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ABOUT THE COVER

View of UPCA Studio Laboratory Building's outer skin over large windows.
(*winning photo entry by Stephen George Sy*)

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Special Features

Editorial

Engage the Public in Conversation

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Design professionals are used to talking. We have been trained to present our design concepts, to convince our audience that we have the best intent and solution to their spatial issues. We have become so engrossed in becoming experts in design, computation, and architectural planning that we sometimes fail to notice that we have been listening to our own voice all along. In the process, we are forgetting the art of listening.

Conversation requires the listening. It is essential to listen to what is being said and what remains unsaid. The eloquence of conversation goes beyond just sending the message across, but by having a dialogue that brings engagement from both parties at the same level. Being (building and/or landscape) architects do not mean that they have the formula of knowing what the public's spatial needs are, but rather they should have developed the skills to facilitate this conversation. The ubiquity of architectural space has made it one of the most familiar disciplines to the public, albeit often misunderstood. Its familiarity has made some people too confident to speak of the anatomy of architecture, diagnose its malady, and even prescribe its "recovery". It has often become a topic of discussions but rarely the topic of conversation. A lot of prescriptions have been offered, but most of the times what they are describing are the symptoms, notably that of society, but not the main issue.

We easily get impressed by majestic and massive structures. We see them jutting out of the skyline, usually without respect to the surrounding buildings. We often expressed amazement upon seeing meticulously designed post-modern landscapes carved out of natural wetland. What we are witnessing is the lack of conversation between our work and the context. We often deal with our work as projects, oftentimes devoid of context and substance, but impressive. Do we deserve a city that lacks coherence and legibility just because we are in the regime that promotes aggressive building frenzy? Or do we just find meaning out of chaos, hoping that there is redemption at the end? The academe has never been absolved of this obsession as it rides this trend of accelerated development at the expense of engaging different stakeholders in the process. Environmental governance does not limit stakeholders to humans and present generations but also considers those that lack the ability to be present and without the capacity to eloquently put their agenda on the table. Those involved in the education sector are also guilty in propagating the ego of the "expert" as they mold students to constantly break from the mold of the ordinary and to be the merchant of the "new". We sometimes forget that we do not have the monopoly of ideas and that there are other sources of information beyond theories and professional business cards.

This year's edition of MUHON readjusts its lens as we engage our public in a conversation. Our public ranges from the marginalized sector, to the church, and even to the everyday pedestrians. Lanyi discussed the efforts and the issues of the church in heritage conservation in his article **"Cebu Archdiocesan Commission for Cultural Heritage of the Church – in Service of Professional Heritage Conservation"**. He exposed the misconceptions in the practice among the different stakeholders and how inefficiencies can be addressed by coming up with a set of guidelines. The ever pressing issue of lack of open spaces is the subject of Morales' paper **"Role of Cultural Development and Public Space Usage for the Poor: Impact to Government Policy and Community Relations (A Philippine Case Study)"**. With very limited accessible open spaces, conflicts and overlaps often exist among various stakeholders. Many purveyors of cultural activities have been identified to contribute to the vibrancy of these open spaces. However, their spatial needs are often neglected due to various reasons, mainly due to the lack of appropriate policies and proper appreciation of these stakeholders.

The multi-nodal development of Metro Manila, driven mainly by private sector initiatives, has resulted to a metropolis that is plagued by mobility and economic inefficiency. The lack of government programs to address these issues has led to more economic opportunities for private developers. Bouquet's **"Landscape of Mobility in Metro Manila's Business Districts"** traced the evolution of transportation-driven developments and emphasized the case of Metro Manila. Many transportation nodes have been transformed into new townships, vertical in orientation, leading to the densification of residents and gentrification of different districts. Liu and He, on the other hand, focused on a specific district in Tianjin, China, on their paper **"Pedestrian Environment Optimization of Xiaobailou District of Tianjin"**. With their meso-analysis

on pedestrian behavior, they pointed out the importance of the presence of choice and the sense of security in order to encourage pedestrianization.

The public market often serves as the center of social and community activities in various settings. It serves as the convergence point of people from different socioeconomic strata, making it important to optimize this very strategic space. Manegdeg, et al's **"Public Market Energy Intensity and a Design of an Energy Efficient, Effective, Healthy and Vibrant Public Market Infrastructure"** assesses energy intensities of public markets. Part of the study is the proposal for a public market design which would result to total lower energy intensity. Related to this is the popularity of the use of solar bottle bulbs as an alternative light source for residences without access to electricity. Bo-ot and Redulla's **"Distribution of Light Intensities of a Solar Bottle Bulb"** tested the solar light bulb in order to verify its performance in terms of the light quality it provides in many of underprivileged areas.

In recognizant of the changes in the landscape of the discipline, the college has inaugurated its new building, which would hopefully open more conduits and venues for collaboration with its public. Former UP Diliman College of Architecture Dean Mary Ann Espina sat for an interview with the editorial staff to discuss the challenges and the process in the making of the new building. The special feature highlights the importance of the setting in the process of creation and in ushering the future of the university and the college. The new building served as the subject for this edition's cover, which was selected from the photography contest launched by the College. This is part of the effort of the College to engage the public in the process of realizing this journal. It has also launched ARCo or the Architectural Research Colloquium to provide additional venue to share their thoughts, researches, and ideas, and to set for future collaboration among faculty, students, and any interested stakeholders. We want to open the conversation with our public and break the walls that have separated the institution from its people. It is important that the institution re-examines its role in society and how it can reflect the changing dynamics of the different themes under the discipline of the designed and built environment.

The different settings – from the macro scale metropolitan area, to the meso-scale urban district, down to the micro scale residential house – require a proper and effective interface with our public. The papers of this edition of Muhon emphasize the need to listen more to make the designed and built environment discipline responsive and relevant. We need to go outside and open ourselves to conversations in order to avoid being confined in an echo chamber of "experts" and decision-makers. As information becomes available and accessible in a seemingly marketplace of ideas, more voices require to be heard, and be included, so that we heed the call and be conversant where it matters.

Role of Cultural Development and Public Space Usage for the Poor: Impact to Government Policy and Community Relations (A Philippine Case Study)

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Abstract

This research focuses on social exclusion due to poverty as observed in urban areas; a phenomenon seen to limit engagement opportunities, lower self-esteem and weaken social access of poor individuals; particularly those based in high human concentration areas typical in cities. Since most people-to-people interactions demand a spatial component to host such activities, the role of public spaces are likewise highlighted due to its accessibility among city residents and visitors. To address the abovementioned social dilemma, cultural development - celebrating binding beliefs and values among people through expression of their culture – was found to create opportunities wherein public space usage is able to bridge social divisions and accommodate opportunities of communal interaction and city development.

This study looks at cultural development and its impact to policy, people, and public space through a medium (art) that highlights unique features embedded in cities and communities. After establishing the theoretical base of this study, case study areas were identified and policy documents were examined to see how governments – amidst limited resources - expand cultural development alongside partner stakeholders. Key-informant interviews were also done to fill data gaps. Research shows that government engages with volunteer groups to strengthen its cultural development agenda; at the same time, poor individuals are found to join volunteer art-groups to learn new skills and expand network opportunities. The collaboration between government and volunteer groups led to events and activities that better utilize socio-spatial potentials of urban areas; using citizen engagement via cultural development to promote social access especially for the poor, while opening public space development and management opportunities for the city. Together, a participative development strategy among poor individuals, volunteer groups and government is promoted; a culture-driven governance policy hinged on improving community relations, social acceptance, and spatial growth opportunities in the city.

Keywords: Local governance, volunteer groups, cultural development, public space, social access

I. Introduction

Poverty is a longstanding pattern of inequality that, as Amartya Sen (1999) has described, is a lack of capabilities that disallow people to achieve things they want to do and experience (Hulme, Moore, & Shepherd, 2001); supported by figures that as recent as 2005, 1.38 billion people worldwide live below the international poverty line of US$ 1.25 per day (Sumner, 2012). It is also a problem observed to be more prevalent among developing societies (Tsai & Huang, 2007; United Nations, 2014), with cities as urban locations where major population movement gravitates towards hosting the main burden of poverty (United Nations, 1990). Originally viewed as 'a lack of income, expenditure or consumption' and analyzed via 'money-metric approaches that measure these deficiencies' through related quantitative forms of analysis (Hulme, et.al., 2001), efforts to understand poverty has broadened to consider quality of life issues in terms of exclusion that is social as well as cultural in nature (UNESCO, 2011; 2017). If we are to look at poverty from this social perspective (Figure 1), the following factors are considered: (1) loss of pride, (2) lack of social support, (3) pervasive feelings of loneliness, (4) lack of dignity, and (5) lack of openness amongst communities (Howe & McKay, 2007; UNESCO, 2011; 2017).

In search of answers, it was found that 'access to support and knowledge' (Figure 1) is a key area to consider in identifying means to rise above this aspect of being poor (Howe & McKay, 2007). In this regard, if a key to understand poverty is through its cultural ramifications, in what way can culture be then used in developing government policy to promote 'access to support and knowledge' so that the poor may rise above social exclusion and a deteriorative quality of living? Moreover, is there a spatial dimension that we need to be aware of for this culture-led development to succeed?

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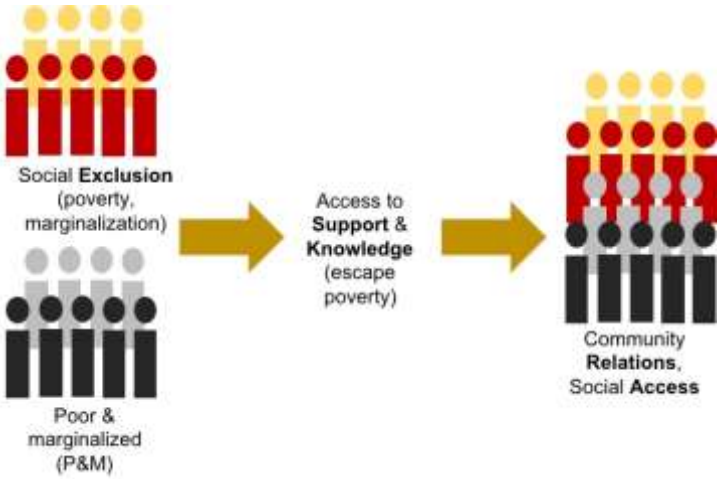

Figure 1. Access to support and knowledge: Means to rise above poverty, improve social relationships for the poor.

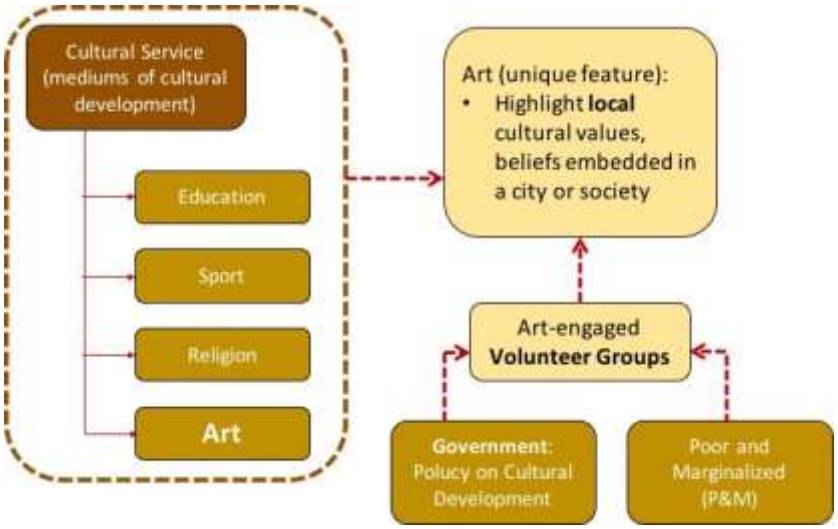

Figure 2. Culture expressed through Art as a unique Development Catalyst for cities and its citizens.

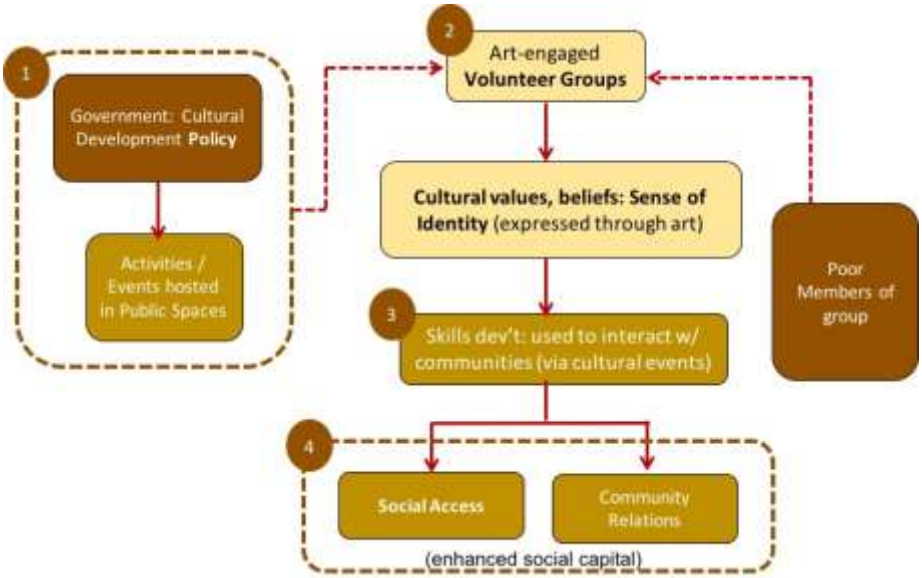

Figure 3. Cultural development through art: Activities/events where art groups (recruits poor members to help them rise above poverty) participate; using public space and gov't policy to promote community relations and social access for the poor.

Culture as Development Catalyst

In 2010, ten years after the Millennium Declaration was adopted by its General Assembly, the UN moved towards recognizing the importance of cultural development in realizing its Millennium Development Goals (UN-MDGs); affirming the role of culture as 'a driver for development, with community-wide social, economic, and environmental impacts; with particular relevance for its contribution to poverty alleviation' (UNESCO, 2012). Culture is defined as a 'stock of tangible and intangible expressions' (Cochrane, 2006; Throsby, 1999) that people use to manifest their respective communal identities; qualities that define common values and beliefs binding them together. It is a cornerstone of human development and social relationships, with its contribution exemplified in its use as a development medium by government to promote understanding and opportunities among the people they represent (Kim, 2011). In this regard, governments were found to facilitate skills development among their constituents through various 'cultural service' mediums; knowledge platforms wherein skills acquired enable people to express the cultural values and beliefs that are of value to the society it represents. Obtained through 'cognitive development, recreation, spiritual enrichment, and aesthetic experiences' (Church, A., Burgess, J., Ravenscroft, N., 2011), these values and beliefs are developed and expressed through education, sports, religion, and art (Cochrane, 2006; United Nations, 2005).

Among these platforms of cultural expression, it is observed that education, sports, and religion have taken a more uniform or international set of cultural features or themes; similar regardless of place or society in which it is being applied or propagated. On the other hand, we may notice that the skills developed towards expressing various art forms (e.g. dance, painting, music, theater, among others) has a capacity to express or highlight local cultural identity traits embedded in a city or society; unique features that local governments may integrate into their policy agenda - to highlight their city's inherent competitive advantages - more so from the social and spatial realms as this research is focusing on. It is in this context that the cultural service of art is focused on in this study (Figure 2).

Cultural Development Policy and Public Space

A key component in this study is how government policy in cultural development leads to skills development opportunities that promote improved community relations and social access benefitting the poor. Beyond social discussions, the spatial dimension wherein culture (through art) allows its practitioners (i.e., the artist) to interact with his/her audience (i.e. the community) and be bonded by their common cultural values is also recognized for its importance; especially as poverty cases concentrated in our urban centers are growing (United Nations, 1990). Recognizing this socio-spatial relationship between tangible and intangible expressions of culture (Cochrane, 2006; Throsby, 1999), it is of interest to know how art-engaged poor individuals are using cultural development policy to impact personal growth, community relations and overall quality of living; as well as how governments are positioning unique cultural features embedded in cities as a development catalyst (Kim, 2011). In this regard, the lead role of government in mobilizing partners and resources to promote development opportunities for the people it serves (especially the poor) is emphasized.

Most of the literature pertaining to cultural development policy focuses on construction and expansion of cultural facilities for urban regeneration, cultural diplomacy or exchange, as well as funding for cultural activities and events (Attanasi, Casoria, Centorrino, & Urso, 2013; Ogoura, 2009; Strom, 2003); while information concerning art-engaged policies and programs that facilitate skills development opportunities for the poor so as to improve community relations and social access (Boykoff, 2012; Nakagawa, 2010) is comparatively few and far between. It is for this reason that this paper is focusing on cultural development as it impacts the poor, with emphasis to policy and community relations.

Regarding public space, we are aware of the role of place making on people's perception of their environment and the communities interacting in it; from the social, functional, sensorial, and temporal dimensions. Places are also deemed to have a sense of purpose, of meaning, to the people developing, managing, and inhabiting it (Harun, Mansor, & Said, 2013). Spaces in the public realm have a profound impact among people and communities: communal interaction among squares, parks, and a variety of open spaces in our cities where everyone is free to access them as they please; offering multiple opportunities for people to interact, bond, and foster relationships inside these publicly accessible spatial hosts to a myriad of social, economic, as well as cultural activities. Authors such as Tveit (2006), Jacobs (1961), Tibbalds (1992), and Talen (2008) talk of diversity in public space usage; allowing passive and active social activities where the richness of our urban tapestry is woven closer because of such spaces that facilitate – rather than restrict – the strengthening of communal relations as well as development opportunities both for its proponents (e.g. government, private sector owners of publicly accessible spaces) and its beneficiaries (e.g. citizenry who patronize the activities and events in these spaces). Moreover, promotion of usage diversity in these public space likewise promotes assimilation as well (Harun et al., 2013); wherein public space becomes a catalyst for socio-cultural, economic, and physical synergy of opportunities among people. Where else can a poor or marginalized person gain the most opportunities to engage with a person from "ruling" elites? Surely not in the privacy of one's meager home or palatial estate; it is in the public realm that makes the greatest case for interaction – hopefully leading to greater understanding and acceptance – possible for the varying sectors or communities representing our societies (Figure 3).

II. Methodology

This study takes a qualitative research path that begun with collected library and internet-based data sources. Data gaps from secondary information were reconciled with collected policy documents from the National Commission for Culture and Arts (NCCA) in Manila, as well as concerned culture and arts office in the three study areas (Angono, Makati, and Baguio). Key-informant interviews from national (NCCA) and local (cultural development offices) government were also made. Acquired secondary data brought forth the need to focus efforts of identifying local study areas where art is used as a skills development platform by art-engaged, volunteer groups (that partner with government); in this regard, it was surmised that there is a need to first find cities/municipalities that prioritize culture as uniquely expressed through art as a development catalyst.

Earlier found in secondary data sources (as discussed earlier), interviews of local government officers in charge of cultural development (in chosen study areas) validated the role of art-engaged, volunteer groups as development partners of government. It is at this point that requests for referrals and introductions from the LGU officer/s interviewed were made, so that the researcher will gain access to volunteer group leaders that actively engage with the local government that they are connected with (as residents of a city/municipality); a form of "snowball technique" in accessing groups or individuals in aid of a non-probability based sampling method. "Snowball sampling is where research participants recruit other participants for a test or study" and "is used where potential participants are hard to find. It is called snowball sampling because (in theory) once the ball is rolling, it picks up more 'snow' along the way and becomes larger and larger" (Statistics How To, 2018).

Formal letters were made informing the leaders as well as members of the referred art-engaged, volunteer groups about this research and the type of information that this researcher hoped to get from the referred volunteer groups. Interview dates were scheduled at a mutually convenient time.

In terms of ethical considerations, the author was careful of the sensitive nature of getting information pertaining to 'poor and marginalized (P&M) members' of these groups. In this regard, the discussion points in this paper are based from Key-Informant Interviews (KIIs) conducted/limited only to leaders of community-based groups; meaning the identities of P&M members were not asked themselves, but rather their leaders who are very much aware of the plight of these members.

However, there naturally is a need to validate these interviews. In the overall research framework (of which this paper is a part of), qualitative results of these KIIs were later validated through a conducted survey (200 respondents); a survey that did not include asking for the names and other information (e.g., full address, contact info) of the groups' members (esp. poor members of these accessed groups). These were purposely not asked so as to protect their identities (and for ethical considerations). The result of this survey, where statistical correlations were tested using Path Analysis (to test hypothesized causalities in terms of acquired cognitive and non-cognitive skills by members of these community-based groups, and how these skills improved community relations and social access), are discussed in greater detail in a separate journal paper submission.

Study Area Search and Data Collection

Mentioned in earlier parts of this paper are instances of poverty concentration that is prevalent among developing societies (Tsai & Huang, 2007; United Nations, 2014), as with cities being urban locations where major population movement gravitates towards hosting the main burden of poverty (United Nations, 1990). It is in this regard that the Philippines was chosen as the country to identify case study areas for this study; an archipelagic nation of 92.34 million Filipinos; with about 57 percent solely based in the main island of Luzon, the country's largest and most populated land mass (NSCB, 2012). Search for case areas was further limited to the Luzon island proper – excluding the provinces of Marinduque, Occidental and Oriental Mindoro, Palawan, and Romblon, as well as the Batanes group of islands – so as to confine field-work travel to that of being land-based (amidst limited field work resources). The fact that the Luzon Island proper still hosts a majority of the Philippine population of 48.49 million or 53 percent of the total number of Filipinos in the country, further justifies validity in using the Luzon Island proper as base area for the search of study areas.

Within the Luzon island proper lie 51 potential local government case study areas; potential cases that are based in cities or municipalities within the Luzon Island proper. Aware that each of these possible cases are represented in a government website, an internet-based search was first made; checking each of these websites' mission-vision policy statements for their respective jurisdictions. The reason is that mission-vision statements that allude to highlighting the role of culture as a major policy thrust in overall development guided this author in arriving at local governments that actively use culture (through art) as catalyst for development. Results of the abovementioned search show that most of the local governments investigated had development policy thrusts focusing on disaster-risk reduction, agriculture, commercial and/or industrial development, as well as environment and climate change adaptation.

However, four distinctive study areas emerged - based from the original 51 cases - that used 'culture and art' as a major catalyst in their respective development strategies. Of the four study areas mentioned, three shall be discussed in this paper: Angono municipality, Makati City, and Baguio City.

Angono municipality in Rizal Province, with numerous art galleries and artist's studios lining up its streets, is situated 30 kilometers east of the capital city of Manila; a small town with origins as a fishing village, and with a land area of 23.0 square kilometers along Laguna Lake (Angono MPDC, 2012). Angono is a 'municipality' under the Philippine's Local Government Code of 1991. 'Municipalities' (or towns) do not have the minimum population or income requirements that can enable it to

achieve a level autonomy that is awarded to many other Philippine cities; hence are deemed part (or administratively dependent) with the province in which they are geographically located. On the other hand, Makati, noted for its Central Business District, is a city located in the middle of the National Capital Region (NCR) or Metro Manila; with a land area of 27.35 square kilometers; roughly 4.3 percent of the NCR's total land area. (Makati-ICRD, 2013). Makati City is classified as a 'highly urbanized city' under the Philippine's Local Government Code of 1991. Highly Urbanized Cities are local government units that are autonomous from provinces. Lastly, Baguio City (same classification as Makati City), with majority of its developed areas located on a mountain plateau on the northern part of the city is located in the province of Benguet; two hundred and fifty (250) kilometers north of Manila, on an elevation of 1,400 meters, and with a total land area of 57.5 square kilometers (Baguio CPDO, 2010). Each study area utilizes unique aspects related to 'culture' and 'art' as a development catalyst for their city or municipality. Two of the case study areas – Angono and Makati – highlight the cultural service of art itself as either a primary or secondary/supplemental catalyst to achieve the aspired development for the city or municipality. On the other hand, the city of Baguio chose to focus on the indigenous culture of its people; intangible cultural attributes that so happen to be best expressed through art.

III. Gathered Data

Art-engaged Volunteer Groups: Impact to the Poor and Public Space Usage

Interviews with leaders of accessed art-engaged volunteer groups allowed this research to determine the factors involved on how these groups were created or formed. It turns-out that most of these volunteer groups were created by art-engaged individuals who have achieved success through their mastery of a particular art-form. Many of these individuals (who later on became leaders of their respective volunteer groups) originating from a relative state of poverty themselves; armed with a recurring motivation or urge to give back to society, or at least allow people who – like them at one point in life - are poor and seeking a better chance of improving their status in society. Interviews of these volunteer group leaders share that along with members who are of relative socio-economic affluence; they also have members who are poor. Interestingly, members who are poor initially lacked self-confidence and were hesitant to engage with members of more affluent status. In time, and as these poor members started to acquire admirable skills in the expression of their chosen art-form, these disadvantaged individuals started to gain more confidence, increased their feeling of self-worth, and begun to be more engaging with the rest of their group. Even from the inside of the volunteer group dynamics, it seems that cultural development has an impact in promoting improved social access and community relations.

Outside of the group, the same increased feeling of self-worth, alongside the opportunities involved in the acquisition of art-skills has enabled poor members to improve their chances of continuing their formal education through art-scholarships or attain employment in related fields. These are believed to collectively allow these poor members to also improve community relations and social access beyond volunteer group dynamics, towards engagement with society at the city level and beyond (Table 1).

Table 1. Summary of Volunteer-Group Benefits.

Social / Cultural	Serves as an escape from a life of gang violence, drug addiction, other negative peer pressures with the youth
	Gain self-confidence through opportunities of interaction with other members of the group; also applied during engagement with society
Financial / Economic	Members, especially those who are poor, get financial allowances to support their academic studies; usually given by local government, or non-profit groups/patrons
	Group membership open employment opportunities for its members
Organizational / Institutional	Using acquired art-based cognitive skills to continue formal education (through scholarships with colleges, universities)

With regard to how cultural development policy by government benefits the poor, the three local case study areas are found to be in-line with program thrusts as pronounced by the Philippine national government's National Commission for Culture and the Arts (NCCA); where the focus is on cultural development itself. However, though the NCCA has implied policy pronouncements on 'poverty alleviation' - inspired cultural development policy thrusts, local governments tend to focus more on the promotion, preservation, and expression of culture as seen in their local cultural policies. At the same time, interviews of local government officials show an awareness of how local cultural policies – through local government programs and projects that people and stakeholder groups participate in – benefit the poor; by emphasizing engagement with art-engaged, volunteer groups who interestingly, are actively recruiting individuals who are mired in poverty. Apparently, these volunteer groups use the art-form they specialize in (e.g. painting, dance, music, etc.) to train young recruits to become skilled performers and artists; a skills-development platform that - alongside participation in local government's cultural programs and events – becomes a mutually-beneficial partnership between government and groups who use culture and art to help the poor.

To be specific, interviewed local government officials stress that local government actively engages with various civil society (i.e., volunteer groups) in advancing its cultural development thrusts. The local government also market its cultural development programs and projects as

a means of attracting visitors to stay and spend money inside their city or municipality via a culture (through art)-based tourism platform. Scholarships are likewise mentioned in interviews and offered to deserving individuals and groups; in whom outputs of said people will be integrated into the government's overall cultural development agenda (as participants in its activities, events). However, there were no official lists that were made available to prove institutionalization of the release of such scholarship funds as implied in the conducted interviews; leading the researcher to believe that scholarship grants tend to be released arbitrarily according to the judgment of custodians of such scholarship grants. A possible drawback of this assumed policy scenario is shared by one of the leaders of art-engaged volunteer groups interviewed for this study; wherein it was shared that there was a time when support for their volunteer group was caught in the middle of local politics. Particularly, there was a time when the group did not receive support because they were the brainchild of the previous leader (which was a political opponent of the current administration). This group became inactive for two years because of this lack of government support.

In terms of public space usage, a common answer by the volunteer group interviewees points toward the value of public spaces as commonly accessible areas where their members – especially those who find themselves in the lower economic rungs of the society they are a part of – can practice as well as showcase their craft (e.g., improving skill-sets, expertise in a chosen art-form). The fact that these public spaces are accessible to all allow these art-engaged groups to freely interact with different communities in the society they are a part of; increasing the possibility of engagement and appreciation of the group members' expertise in expressing cultural values celebrated through art; values that are oftentimes deemed laudable by other members of society. These socio-cultural interactions - hosted in public spaces – hasten interactions appreciation and understanding among societal members; where issues attached to socio-economic considerations (e.g., poverty) is put at the rear, and culture (i.e., artistic excellence expressed in public space) is put at the forefront of local development opportunities of people and urban areas.

With regard to how local government consider public space as a catalyst of local development, it was found that local governments are able to maximize key public space locations such as squares, parks, and other open spaces within their city/municipality; taking advantage of historically identified and traditionally recognized places of public congregation where everyone is free to access it as they please. These spaces, usually integrated into the study areas' cultural development agenda (as venue of cultural activities and events) offer multiple opportunities for people to interact, bond, and foster relationships amidst a variety art-based cultural activities and engagements among its constituents.

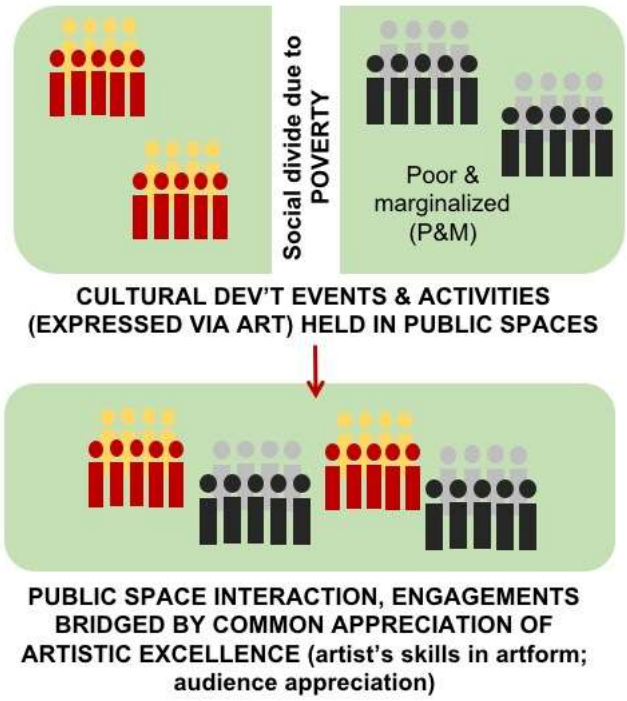

Figure 4. Public space usage (host of events allowing artists to showcase their craft to public) as conduit of socio-cultural interactions regardless of socio-economic status (notions of being rich or poor is overshadowed by a common passion to an artform).

IV. Results and Analysis

A recurring theme among the interviews conducted point to the role of cultural activities and events as catalyst for collaboration between the government and art-engaged volunteer groups; using these events to advance their respective agenda: the government as a means to promote local culture as a development catalyst (generate culture-based jobs and industries to improve the lives of its citizens), and art-engaged volunteer groups using these events as a stage for their members to perform or showcase their skills and crafts with the communities they hope to engage further. This is all the more important to volunteer group members who are poor; since they are the individuals that are most vulnerable to social exclusion due to their state of poverty. By tapping into the value of excellently (and admiringly) expressing the exalted cultural values and beliefs in events attended by many local (and visiting) groups, these volunteer groups are able to impart skills training, support, and opportunities by positioning their members (especially poor members) with greater chances to showcase their newly acquired skills, and be admired, celebrated, and accepted by the society of which they are a part of.

Local government takes a lead role – with the complementary assistance of art-engaged volunteer groups - in the development of culture in their respective cities or municipalities; consistent with policy discussions from previous paragraphs stating usage of culture as a platform in opening development opportunities. Also, in recognizing the value of developing culture through acquisition of cognitive skills, local governments provide elementary and/or high-school scholarships/allowances to individuals and groups (e.g. art-engaged volunteer groups) that would further promote the cultural development strategy embraced by government. To be more specific, a recurring issue with poverty is many of its victims are forced-out of school so they can already work and help the family with their daily needs. Acquired and developed artistic skills were found as being used by its practitioners (especially poor and marginalized volunteer group members) as a means to acquire skills that were used to broaden one's livelihood-generation opportunities. Some of these young artists used their art-skills to get accepted into colleges and universities through art-related scholarship grants (allowing them a chance to get a degree from a course that, prior to art-skills acquisition, was a highly difficult prospect to achieve); some choose to use art as an immediate way of earning a living; from getting commissioned works for art installations, to joining dance and musical competitions, the winnings of which are used in augmenting the family income of the said member/s. From the local government side, the improved skill levels of these young individuals – members of art-engaged groups residing in said LGU's jurisdiction – broaden the pool of talent that these local governments actively engage in at their respective cultural tourism agenda; having highly skilled performers competing and showcasing local culture and identity cues, which bode well in attracting tourists and potential investors attending the LGU's cultural events embedded in its tourism offerings (e.g., art festivals, town fiestas). From generating valuable skill-sets among the youth (especially poor and marginalized), to broadening the event offerings in an LGUs cultural tourism agenda, a win-win scenario between local government and these volunteer groups is seen.

Regarding social issues benefitting people (especially with the poor), it is observed that local governments highlight the contribution of art-engaged volunteer groups participating with government as partners and participants in its cultural development agenda. Discussions realizing social benefits such as improved community relations and social access (i.e. greater acceptance, admiration in society especially for poor members of these groups) through cultural development are also mentioned as a contributory role of said volunteer groups.

In terms of public space usage and how it relates to local development opportunities, it was found that public spaces become the staging area in which members of art-engaged volunteer groups, whose members (especially poor ones) are participating in the public space located, cultural events by government, are able to partake in a community impact of art in terms of 'providing inspiration to others'. Quoting one volunteer group leader, *'When we have free shows or other performances as well as during outreach programs, some of our audience show their interest to become part of our organization because we inspire them and they get to feel the positivity in us and by looking at their faces, you would see that they want to become like us and join us in the group'* (Morales, 2013; 2014). This input coincides with observations by this author wherein practitioners of a particular cultural service (e.g. art) – wherein excellence leads to admiration from the performers' (or artist's) audience – lead to heightened social value among the community of which he or she is from, as well as the communities that this same person feels excluded from due to being poor. A quote from another key-informant in this research shared that, *'art involves interaction with the audience; through facial expressions and actions, you know if the audience appreciates your work of art'* (Morales, 2013; 2014). To be more specific, artistic performances being made by art-engaged volunteer groups get inspiration from the level of appreciation its audience reciprocates to the performance being made by the artist. Positive 'facial expressions and actions (e.g., clapping, dancing along a performance, among other cues) is viewed as admiration and validation of the work made by the artist to hone his/her craft; leading to an increase in confidence and inspiration that inspires the artist to further develop his/her artistic skills. Moreover, this improved confidence and develop skills in a particular art-form enable an artist/performer to be appreciated more by the community he/she grew-up in, and in a larger context, the society/ies that he/she interacts with as part of a group that performs especially in public spaces where different social groups are present (i.e., commonly accessible areas in a city/municipality); especially in cultural (art) events hosted by government, and attended by local and foreign visitors and tourists, to name a few (Morales, 2013).

Based from the shared life experience by members of art-engaged volunteer groups, it may be surmised that this appreciation generated by the audience for the performer or artist leads to improved community relations and social access. Of course, the role of public space, where these opportunities of cultural interactions take place, is duly recognized; proof that an awareness of the socio-spatial relationship embedded in cultural development (Paddison & Miles, 2007) may benefit not only people and communities, but also to the proper usage – as well as development and maintenance of public space – which government proponents use in hosting related culture-based artistic activities and events.

V. Policy Implications and Future Research Opportunities

Causal relationships in cultural development benefitting the poor may strengthen policy implications where government may more actively use culture in promoting improved quality of living for its citizens (especially for the poor). Based from information compiled in this research, possible policy implications on alleviating poverty and marginalization may be based on employment generation and industry creation; based from

the themes highlighted in previous sections of this research, namely:

- Promotion of local culture policy as a development catalyst (to generate culture-based jobs and industries and improve lives of citizenry)
  - To be more specific, a policy wherein LGUs may strengthen their local tourism agenda with a cultural dimension (as expressed through art) could be adopted; paving the way for events to be created that will demand groups or individuals who specialize in particular art-forms (e.g., musical competitions, art contests, dance-offs, etc.). This will create opportunities for community-based organizations to thrive, and more importantly, give exposure to its members (particularly those who are poor and marginalized, gaining recognition through these local events).
- Recognize value of developing culture through acquired artistic skills (especially for poor and marginalized individuals) as means to continue formal education (refer to earlier section of this paper and Table 1 for more detailed discussion on how formal education opportunities are enhanced by members of these art-engaged volunteer groups) and/or improve confidence to interact with and be accepted in society
  - LGUs may also choose to financially support top performing groups/individuals to join higher level competitions (e.g., provincial, national level)
  - The skills learned as well as exposure garnered by these artists will bode well for them in getting employment opportunities in other parts of the country, or maybe even abroad (e.g., musical performers at Hong Kong Disneyland, musical artists at the Manila Philharmonic Orchestra) as some possible employment opportunities that can take root if a strong community-based (grassroots) program for discovering and developing talent can be promoted.
- Role of public spaces being used by art-engaged volunteer groups in staging activities and events for their members to perform or showcase their skills and crafts
  - LGUs may engage the assistance of these community-based groups in maintaining or developing spaces in the city/municipality, in exchange for giving exposure to these groups in the LGU's tourism (culture and art based) development agenda. This way, it will be a win-win scenario for both sides; the LGU will have a partner with the logistic and expertise to develop or manage public spaces in need of care. At the same time, the community-based group will have a place to practice, perform and a space they can call their own; a place of refuge especially vulnerable members of these groups who are in need of a place to belong, or call their own (Poor and Marginalized or P&M members).
  - LGUs may choose to identify under-performing (relatively unused) public areas or spaces (e.g., a park or community playground). After finding out these under-utilized public spaces, LGUs may opt to offer project grant program to interested individuals; wherein their project proposals (in need of funding, like a dance or art competition, or maybe an performance art and exhibit) will be considered for the grant award, if the location of such proposed projects will be in one of the under-used spaces in the city/municipality in need of revitalization. In this case, "culture and art" (as embedded in a dynamic, community-based tourism agendum) can be used as a tool to reinvigorate under-utilized public spaces.

As detailed above, these policy proposals all are in an effort to recognize unique cultural features of cities to be identified and supported further by government, and efforts to reconcile how government can better harmonize art-skills development to opportunities of continuing formal education (e.g. more art-skill based academic scholarship grants) or get employment (e.g. support culture-based tourism) in local areas may likewise be explored or strengthened.

Moreover, initiatives meant to promote and support the activities of art-engaged volunteer groups (i.e., art-skills development) may also be considered; a policy direction wherein local governments may promote (a) competition, (b) support, and (c) public space development and management initiatives may be recommended. These policy measures are meant to create instances wherein these volunteer groups are able to test their art-skills excellence by competing with similar groups in a fun and friendly atmosphere; and from these competitions, it will be easier for local government to identify which groups are in need or are worthy of further support; and lastly, by generating more activity for these groups (thus making their existence more vibrant and dynamic), it will be easier for these groups to mobilize its members (as well as potential patrons) in identifying and managing under-utilized spaces in the city as a place where these groups may practice as well as perform; to be seen and appreciated more by people (since these are in public spaces, art becomes more accessible to the masses also).

As alluded in the last paragraph, the value of developing culture through acquired artistic skills, cities (i.e., especially those with a strong cultural identity that can be used as a catalyst of tourism) may be considered by creating short, medium, and long-term cultural development (through art) masterplans that not only seek to create tourism-based industries and development opportunities that will be beneficial to the city as a whole, but would also specify citizen and group beneficiaries (with an emphasis to those who are poor), as well as local government collaboration opportunities with both the private sector and civil society to create opportunities to maximize showcasing of acquired artistic skills of volunteer group members; creating livelihood opportunities and increased chances of social interactions that may lead to other opportunities beneficial to the artist

as well as the audience/communities watching or appreciating the artists' skills, work, or craft.

Lastly, with regard to public space usage, reviewed literature has told us of culture's social, as well as spatial, properties (Paddison & Miles, 2007). Beyond social relations as espoused in this research, it is believed that there is also merit in studying policy implications with regard to physical or spatial aspects of creation of cultural identity. This is exemplified by the findings of this research, where it was found that the value of public spaces as commonly accessible areas where their members – especially those who find themselves in the lower economic rungs of the society they are a part of – can practice as well as showcase their craft (e.g., improving skill-sets, expertise in a chosen art-form).

In relation to this, interviews with National Commission on Culture and the Arts (NCCA) staff reveal that NCCA becomes aware about the specific location of the projects that they financially sponsor annually (through their "National Endowment Fund for Culture and the Arts" or NEFCA) only *after* the project has been finished and the project proponent has submitted a report about the finished project (Morales, 2013). It is believed that there is merit in focusing not only what the cultural development project is about (e.g., is it aligned with agency thrusts), but also *where* it is to be done (or located) *prior* to release of financial support (e.g., is it in a public space, or a private exclusive area). National government may require local counterparts to provide lists of public spaces in their city, which they recognize as catalysts of cultural development. Secondly, national government may request a list of *actual public spaces being used* in their annual cultural projects (activities, events). Once the national government knows which of the public spaces initially recognized as catalysts of cultural development are not maximized, it is in a better position to request project proponents asking for financial support to find ways of using the said unused public spaces by collaborating with the concerned local government where they plan to hold the event. This way, a national government is in a better position to assist local governments maximize their unique cultural (social and spatial) features; alongside promoting their own national development thrusts and priorities as they see fit for application in the local level. Of course, the role of volunteer groups (e.g. art-based volunteer groups) as units that can help government in the development or management of these spaces should also be considered; not only in widening governance capacity and usage of under-utilized spaces, but also in enhancing the cultural development agenda of the city through events and activities to be borne out of this heightened development and usage of public space for cultural activities.

VI. Conclusions

The representation of government policies in cultural development as manifested in the study areas cited in this study – especially in relation with poverty – suggests of potentials in broadening the manner by which concerned government agencies can widen their mandate of 'culture and art' beyond their primary reasons of institutional responsibility. Amidst broadening policy, programs and projects that explicitly detail poverty alleviation via cultural development, government engagement with volunteer groups is seen as another way in which engagement with partners allows government to further realize its cultural development vision for the poor. As established in this study, cultural policy directions may be enhanced in a way wherein national government could take steps in identifying and supporting local governments that choose to use 'culture through art' as a development catalyst, and to better mesh with local policy; taking advantage of the strengths of each other for their mutual benefit. Likewise, the role of art-engaged volunteer groups should also be recognized as a partner in not only the successful implementation of cultural policy, but in making sure that these policies are made to benefit the poor.

Likewise, the emergence of art as a viable factor that makes cultural development a useful resource for governments and cities is of value to consider; especially with regard to its social – and its spatial – attributes. It is believed that a better understanding of these socio-spatial features can be used to benefit government as it seeks to improve its capacity to serve the citizens it is sworn to serve, as well as the people (e.g., the poor) who need more attention or assistance from government. The role of public space in government initiatives to open development opportunities as well as improved social relations among the people who use these spaces would be a topic worth investigating further; with the manner by which the celebration or expression of culture is harnessed in utilizing these spaces representing a foundation of sorts that future research endeavors may choose to elaborate on.

In closing, this research sought to establish the impact of culture in benefitting the poor as influenced by government efforts in cultural development; highlighting the role of volunteer groups engaged in a cultural service that uniquely highlights local cultural features, and in the process enhancing community relations, government policy, and public space usage. This author recognizes that this research endeavor is only a small facet in the vastness of potential applications related to cultural development. Should there be shortcomings to be discovered, this author humbly extends his apologies. It is hoped that this work may be used to engage other researchers on finding better applications of culture and its engagement in cities and societies, particularly in favor for those who are most vulnerable and have the least in life.

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Cebu Archdiocesan Commission for Cultural Heritage of the Church — in the Service of Professional Heritage Conservation

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Abstract

This research analyzes the history, statutes, and opportunities of the Cebu Archdiocesan Commission for Cultural Heritage of the Church (CACCHC) to increase its efficiency. As the representative of the Archbishop of Cebu, the Commission carries the responsibility for the quality and quantity of architectural conservation activities of the Archdiocese which are still dominated by amateurish approaches. The Archdiocese is seriously interested in heritage conservation but ignorance and lack of resources create obstacles. This study's main objective is to analyze the reasons of inefficiency and to offer an updated operational model. The results and findings of the study may contribute to the making of an efficient Commission that promotes knowledge on the history of architecture in Cebu and understanding the Filipino cultural identity through a better state of sacred heritage.

The study's scope includes objective and subjective factors of the Commission's efficiency and the proposed new model. The research was limited to the field of competency of the Commission. Its study population consists of persons who were involved in the work of the Commission from 2014 to 2015, the timeframe of the research. The research design is envisioned to lead to a better operational model based on cross-sectional descriptive data from interviews, documents, and case studies which made it possible to compare the Commission's performance with its intentions. To achieve the intended output, input variables (i.e., financial and manpower resources, and field of responsibility) were analyzed and recommended to be enhanced.

Keywords: heritage conservation, monument management, church administration, sacred architecture, concept of heritage

I. Introduction

Successful heritage conservation depends not only on technical aspects, but also on the owner's attitude. This observation is apparent in the present study on the Cebu Archdiocesan Commission for Cultural Heritage of the Church (CACCHC, further: Commission) which coordinates the conservation of sacred architecture in Cebu and is responsible for the quality and quantity of conservation activities in the Archdiocese. The main inspiration of the research was made possible due to the interconnection between the Department of Architecture of the University of San Carlos (USC) and the Commission, as well as the assistance of highly professional volunteers. Being both an Architecture instructor and a member of a Catholic religious order, the researcher has been exposed to the different experiences and feedback from all stakeholders of the architectural heritage conservation in the Archdiocese. Among them are members of the Commission and the Parish Council, heritage documenters, designers and contractors. With the growing national consciousness in the Philippines, religious heritage structures have become part of the national identity, regardless of one's confessional affiliation. After calamities, successful heritage retrofitting is a powerful sign of hope through architecture.

The Commission was established by His Eminence Ricardo Cardinal Vidal through a foundation decree in 2002, for the purpose of more effective heritage conservation. The Executive Report of the Cebu Archdiocesan Commission for the Cultural Heritage of the Church formulates its role as "*to superintend all the conservation, restoration, preservation initiatives of all parochial churches and their adjunct structures and their holdings therein*." (CACCHC, 2011) In short, the main task of the Commission is to "*preserve the patrimony*". The Commission is supported by linkages to ecclesiastic, governmental and educational institutions.

For better implementation, three years later, a document of the Archdiocese was published: *Circular No. 10/05 on May 25, 2005, Re: Norms Governing Church Restoration* which directly refers to new-evangelization. The Archbishop declared the following norms for the Archdiocese:

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1. "All proposed projects for the restoration, preservation and remodeling of parochial churches and chapels be submitted to our Archdiocesan Commission for the Cultural Heritage of the Church for its qualified perusal.
2. The proposal shall consist of the architectural plan, site development plan, pictures and bills of materials to be attached to covering letter of intent duly signed by the Resident Parish Priest.
3. The aforementioned Commission shall study the proposal and shall conduct an ocular inspection of the site to ascertain its conformity with the requirements of civil law on buildings and constructions, on conservation principles as well as canonical legislation on liturgical environment.
4. After its study and ocular inspection, the Archdiocesan Commission shall transmit its observation and recommendations in a written report, to the Archbishop of Cebu for his prudent judgment.
5. No parish may commence restoration or remodeling work without the expressed permission of the Archbishop of Cebu, either directly through his office or through his pastoral arm, the Archdiocesan Commission for the Cultural Heritage of the Church" (Archdiocese of Cebu, 2005).

Later, the Commission issued a systematic Manual for the Registry of Heritage Structures and Objects of the Archdiocese of Cebu (CACCHC, 2010). After a description of the "patrimony of the Church", it gives a theological reasoning for patrimony as recognition of previous generations of faithful Cebuanos, and a detailed instruction of the Commission's duties. As results of the Manual, the Commission successfully started with the conservation of many churches, and also published a book on the "Sacred Treasures of the Archdiocese of Cebu".

Architect Becker-Ritterspach (2014) states the objectives and conditions. "Individual knowledge and competence must be coordinated. Independent actions have to be avoided without consent of the owner or without permission by competent authority or without financial means will lead to disastrous results". Furthermore, "the competent authority has to be identified on the basis of the legal budget and the organization. Every step and decision taken has to be based on this structure and must include the units (persons) concerned with the various tasks of maintenance and reconstruction".

In an effort to search for a more efficient operational model for the Commission, the research was endorsed by His Excellency Archbishop Jose Palma, Archbishop of Cebu, and Architect Joseph Michael Espina, Dean of the University of San Carlos College of Architecture, Fine Arts and Design (USC-CAFA), who supervised the College's Conservation and Heritage Research Institute and Workshop (CHERISH), the heritage institution of USC-CAFA. It is assumed that an effective heritage commission will be the adequate response of the Church to the funds coming from the Government and from abroad for heritage conservation of churches. This improvement can be achieved by a qualitatively new operational model of the commission, which this research intends to deliver. It is hoped that with the new operational model, along with enhanced resources and enhanced field of operation, can be useful to other religious heritage conservation stakeholders.

Regarding the concept of ecclesiastic heritage work, an address of John Paul II in 1997 provided a clear overview, identifying three categories of heritage awareness. First, there are goods "placed at the service of the Church's mission" which has its focal point in the liturgy. The second group comprises goods at the service of culture and Church history. The third group includes goods produced by means of mass communications which also bear artistic and ecclesial values (Pope John Paul II, 1997).

Regarding higher local ecclesiastic organizational structures, the Permanent Committee for the Cultural Heritage of the Church of the Catholic Bishops' Conference of the Philippines (CBCP) is important, with clear by-laws. However, as each diocese is autonomous in the Catholic Church, a hierarchic recourse cannot be done through the above mentioned bodies but only in the official way: parish priests, diocesan bishop, archbishop, and Vatican through the Nunciature according to Rev. Father Ted Toralba. The structure and functioning of the Committee is also inspired by the well-known governmental committees like the National Historical Commission of the Philippines (NHCP), which deals with heritage issues.

II. Methodology

The first part of the analysis is a presentation of the most basic documents on the overall competency of the Commission, followed by documents on the factual operation of the Commission, and records on physical observations regarding the state of heritage entrusted to the Archdiocese of Cebu. Based on these data, an analysis was made focusing on the inefficiency of the Commission in architectural heritage conservation. The interviews showed that efforts were made. However the operational and architectural records proved that these efforts frequently do not meet the original intention due to inefficiency or has not been met. If the Commission is not efficient, how can its efficiency be improved? Given the intentions of the Commission, its operation can be realized with a new operational model. The research is limited to organizational abilities, competencies and performances of the Commission. In particular, it is conducted only among the members of the Committee on Sacred Places, Arts and Architecture, which is one of the four committees of the Commission. Statements about heritage structures have only supportive function. The research was based on a single cross-sectional descriptive data gathering method based on interviews, documents, and case studies conducted in 2014.

The data are based on the interviews, documents, and case studies, which were compared with the expected outcome based on the Committee's regulating documents with records regarding the Committee's real time institutional behavior (responsiveness), and records on physical, and non-physical outcomes of the Committee's work. These interviews constitute the primary source of my research.

The research was conducted with permission, and blessing of the leaders of the Commission: His Excellency Archbishop Palma and Rev. Fr. Brian Brigoli. Aside from granting the interview, both of them made all relevant documents available for the researcher. The researcher first interviewed members of the Commission, then priests and parishioners who handled architectural heritage conservation projects in the archdiocese. In March 2014, the researcher made the first interviews with the following leaders and members of the Commission: Archbishop Palma, Fr. Brigoli, Archt. Melva Java, and Archt. Maxwell Espina. In the next months up to August 2014, the researcher managed to interview Msgr. Carlito Pono, Dr. Jocelyn Gerra, and the financial adviser of the Commission Fr. Generoso Rebayla SVD, who as Vice-President for Finances of the University of San Carlos, is an experienced finance expert. The academic resource persons were also contacted. The heritage professionals of USC-CHERISH included Ar. Vangie Ulila and Ar. Rey Osal, who were very much willing to express their opinions. From both sources of the Commission and USC the researcher tried to find out where the cooperation between heritage experts and parishes of the Archdiocese was successful and where it was problematic. The parish of Fr. Pono in Carcar City was one of the enlightening examples. Another successful cooperation was noted in the Cebu-Pardo Parish where Fr. Ancajes and the Vice-President of the Parish Council Engr. Tomanda were glad to explain their experiences and their recommendations. The researcher also wanted to interview "problem cases", parishes where both Commission members and USC-CHERISH experts saw problems. The researcher believed that the respective parish priests have pointed out some difficulties and voice out their recommendations. Although the researcher made maximum efforts and was supported by a written recommendation of the Archbishops in approaching these parishes, seven such stakeholders, who in fact carried out important projects connected with the Archdiocese's sacred heritage, had decline to give an interview.

III. Results and Analysis

The data gathered include the following documents: interview transcripts, rules and regulations of the Commission. The researcher's own observation records were strongly supported by heritage survey records carried out by German heritage specialist and architect, Dr. Raymund Becker-Ritterspach, accompanied by USC-CHERISH heritage experts. At the end of the research paper, the elaborated new operational model is presented that aims to enhance the financial and manpower resources of the archdiocese.

While observation records demonstrate the factual physical state of heritage objects of the Archdiocese of Cebu, the interviewed users presented intentions, approaches, and efforts which are very different from the needs that have been formulated by technical, architectural and heritage conservation experts. The very different views of heritage users and heritage experts call for reconciliation of their ideas. The contrast between the experts' objective architectural observations and the users' subjective intentions proves that one of the greatest challenges of the Commission is caused by misconceptions of priests and parishioners. They think that conservation is mainly beautification, thus it will easily degrade its value if it contrasted with accommodating the needs or financial problems. Others accuse conservation of "turning churches into museums" which would find alternative the living faith. One who uses an old building, even just because he cannot build a new one, must care for its static stability. In particular after natural disasters, experts dedicated themselves to the question, if it is still worthy to rebuild these churches. The question is challenging and responding to it is not the task of this research. Once the decision has been made to keep old buildings, measures against possible collapse should be done.

One of the frequently misunderstood problems is the load-bearing capacity of coral stone masonry. Erroneous renovations and lack of maintenance weakened the disaster-resistance of heritage churches. According to Architect Java, if the new material – reinforced concrete or steel – takes over forces from higher portions of masonry, the coral stone might fall, because it is softer than contemporary materials.

Another general problem is the old, and leaking roof which is made of materials not available any more. Lacking safety on church construction sites constitutes a grave problem, mostly because parishioners in "community extension" lack professional training, or the parish focuses on spirituality rather than on bodily needs. As Becker-Ritterspach (2014) stated: "The cost arising from neglecting regular maintenance and repair are [sic] immensely high and frequently lead [sic] to the total loss of a monument or parts thereof – due to lack of major funds then needed". He documented several hazardous practices in the minutes of his inspections (see in Appendix), with support of well-known governmental committees like NHCP which deal with heritage issues.

Figure 1. Boljoon church, erroneous roofing.
Source: Becker-Ritterspach (2016 Visitation at Cebu-East)

Table 1. Assessment on Time Management.

Task (# as in the Manual)	Expert Work (Preparation)	Expert Work (Decision)	Assistant Work	Remarks
1.1. Ocular Inspection with Interviews	2 days	1 day	2 days	---
1.2. Production of a Significance Assessment	---	1 day	---	---
2.1. Literature Documents Research	3 days	---	2 days	---
2.2. Detailed Information from Applicable Disciplines	2 days	---	3 days	---
2.3. Scientific Physical Investigation	2 days	1 day	2 days	---
2.4. Archaeological Excavation	(2 days)	(2 days)	(60 days)	If funds are available.
3.1. Prepare Registration Certificate with Correct Wording	1 day	---	---	---

Table 2. Desired outcomes and their realization according to the Commission's Heritage Manual.

Desired Outcome as in the Heritage Manual	Stage of realization	Remarks
2.1. Registration	Not realized	It is necessary to create own registry for the Archdiocese.
2.2. Permanent markers (prepared by Archdiocese)	Not realized	Some informants say that the Archdiocese could accept markers put up on expenses covered by the Government.
2.3. Repair or Retrofitting (if needed)	In a few cases finished, in some cases started, in many cases not even started. *Remark:* The preparation works was not performed by CACCH, nor by contractors, but *by CHERISH* (free of charge).	This should be based on the registration (respectively the documents that justify the registration)
2.4. Maintenance	Not organized.	It needs a permanent system which is independent from construction measurements.
2.5. Documentation (after repair/reconstruction or retrofitting)	The preparation was not made by the Commission, nor by the Contractor, but by CHERISH	It needs a permanent system which is independent from construction measurements.

The interviews with different stakeholders proved the same violations. The Commission has often managed to intervene successfully. Sometimes however, as stated in interviews with all stakeholders, it failed to push through with the correct principles or would require an intervention of the Archbishop. Msgr. Carlito Pono Jr. related that Cardinal Vidal was very supportive of the Commission. He always called out on priests who violated rules and requested a change. Msgr. Pono also explained that during the time of Archbishop Palma, there were much less violations, thus he never needed to report violators.

A. Conditions

The core problem stems from the belief that many priests and parishioners cannot fully accept yet the Commission as a competent authority. This impression was unavoidable when the researcher was documenting the comments from architect members of the Commission and also observing reactions of priests and parishioners.

B. Finances

Financial problems might not seem to be a major issue because, at present, the enthusiasm of the Commission members neutralizes financial difficulties. As volunteers they pay for their own fuel while going on field trips, and they often generously offer the Church many other resources. However, with growing tasks, financial limitations will soon become an obstacle because the number of generous volunteers is limited. Interviews with former or present members of the Commission showed that parishes sometimes did not take the Commission seriously because of their lack of budget. In fact, most of the parishes have to find the money themselves to use for conservation purposes. Small parishes are in a difficult situation because their finances are rather limited. They do not have many Overseas Filipino Workers (OFW) ex-parishioners. Although no parishes would question the importance of instructions coming from the Archdiocese itself, they feel handicapped in providing for their practical needs. Some interviewees mentioned that there were attempts from the parishes to support the trips and the professional work of the Commission members from their own money. This is actually contrary to what is stated in the Manual.

C. Time Management

Similar to governmental heritage offices, the Commission has to carry out a complicated registration procedure before physical conservation works. This procedure is tested from the aspects of time, budget, and organizational structure. The researcher created an assessment table (Table 1) which analyzes the time for each operation required by the Heritage Manual. Thus, 10 days (or 12 days with archaeological excavation) of expert preparatory work, three days of expert decision work (or five days with archaeological excavation), and nine days of assistant work (or 69 days with archaeological excavation) are needed for each object. The biggest difference would appear in case of archeological excavations, or if the place of the heritage structure is far from Cebu City, the headquarters of the Commission. We can state that with the present manpower of the Commission, it is impossible to carry the required high time-consuming activity just for the preparatory operations. Table 1 presents the actual needed time to satisfy demands presented in the Commissions Manual. Even with best efforts, this is not possible. This fact generates the call for a new, more efficient functional model.

D. Organizational Competence

Several present or former members of the Commission mentioned that they did not experience the expected support from the parishes. Asking for the reason, the researcher was told that although the priests knew about the Commission, they were not aware how far the principles can be implemented in reality. Since they themselves solicit the money, the parishes feel the emotional need to be included into the conservation process as another authority which would sometimes compete with the Commission. Members of the Commission also observed hesitation among priests to allow the registration of their buildings. The previous parish priest in Argao was afraid to let buildings of the parish be registered because he thought that the parish would "lose" them according to Msgr. Pono. Archt. Java stated that others were afraid that they will have to pay the execution of important requirements which cost more than the support to be received in return from the government or the Archdiocese. On the other hand, both Dr. Jocelyn Gerra and Ar. Omar Maxwell Espina said that others requested the members of the Commission to follow their professional training for competence since not all are architects nor archeologists.

E. Features of the New Operating Model

The tasks that the Heritage Manual of the Archdiocese expects from the Commission are a consequence of required procedures from registration to completed conservation according to international standards. Regarding performance, time consumption of each outcome can hardly be estimated without precise data. Table 2 assesses their stage of realization with some remarks.

1. The first task is the decision to register an object. According to the interviewees, no official registry of cultural heritage objects of the Church has been created yet. Although the Commission has made big efforts, until now no formal decisions have been published by the Archdiocese. If the preparatory procedure is correctly done as previously described, decisions can be done very fast and at no expense. However, negative reactions from the parishes might cause delay or expenses.
2. The second task is to provide registered buildings with a permanent marker. Theoretically, no expenses from the Commission might come up because all costs should be covered by the respective parish.
3. The physical construction work should be determined by the parish itself because it will carry the cost. By now, the Commission has successfully supported a

number of church renovations, mostly due to the enthusiasm and generous voluntarism of its members.

4. A regular supervision of state of preservation is required from the Commission. It is difficult to estimate the time, finances and organizational efforts needed for this. It demands more efforts than the current practice.
5. Maintenance is a clear obligation of all heritage owners.
6. Documentation is to be done before, during and after the conservation process. Although the Commission makes great efforts towards carrying out its assignments arising from the Manual, Table 2 assesses many of the shortcomings.

F. Urgency to Introduce the New Model

The proposed operational model should have the following attributes: first, the Commission should improve its human resource conditions. Second, some additional fields of heritage conservation should be included.

1. At present, the manpower of the two volunteer architects is not sufficient. They work without any remuneration, not even for their transportation expenses. They do not have enough time to carry out the work perfectly. Although their enthusiasm is admirable, there are physical and financial limitations on a person's capacity.
2. Providing solid resources of time, finances, and organizational strength are necessary for successful heritage management.
3. Providing these resources is not a waste of Church's resources and it does not weaken voluntarism. To the contrary, success as a consequence will strengthen the desire to carry out conservations in a professional way and encourage volunteers to invest their time and money in support of conservation activities. It will also encourage young professionals to choose the career path of conservation, instead of better paying opportunities.
4. Serious and expensive conservation needs an efficient coordinating body with more manpower and financial support that will complement generous, unpaid voluntarism.

IV. A Proposed Model to Enhance Field of Operation

A. Towards a Centralized Monument Care

Until now there is no system of registration of these experts. Based on the German conservation experiences, Ar. Becker-Ritterspach recommends a central pool of materials/equipments/experts, mostly for physical construction works that can help wherever it is needed. This must be a form of encouragement for professionals to be ambitious and become real experts in aspiring to be included into the registration (Becker-Ritterspach, 2014).

The researcher recommends that only the decision-making task of the experts, who are mainly architects, should be pure and voluntary in order to maintain their credibility. In line with this, the preparatory part of the experts' and the assistants' work should be paid. The necessary amount should be calculated and charged to the expenses of physical operations. Also, income from cultural institutions of the Archdiocese like the Archdiocesan Museum should support the Commission. As Ar. Becker-Ritterspach (2014) stated, "Solid financing is a prerequisite for successful building results. It is necessary to have both a budget plan on the one hand and also cost estimates/calculations according to the state of planning knowledge." Big parishes should share conservation expenses with small parishes that have heritage objects. Partnerships should be promoted. Moreover, a central fund of the Archdiocese can be created to support these small parishes by donations from bigger parishes. In order to spread heritage consciousness among Catholic parishioners, the Commission should promote Heritage Councils in each parish that also include parishioners with relevant professions from different sites of heritage awareness. The Commission should find international funding for heritage work. For this task, the presence of a permanent staff like a secretary is recommended.

In addition to this, he suggests a centralization of monument planning. But he adds: "It has to be kept in mind, however, that it will take time to establish such a team with long-term experience. The advantage will only develop if the continuity of personnel is part of a strong administration. It is recommended that CHERISH will be a steady partner of this team" (Becker-Ritterspach, 2014).

The situation in the Archdiocese of Cebu is different from that of European conditions. The Archdiocese is not used to perform construction works. However, the big number of believers and parishioners led most parishes finding parishioners in their own circle who have equipment. In some cases, only small contractors are willing to work on church heritage renovations. They are afraid of losing jobs if the Archdiocese itself would carry out construction works or provide equipment.

B. Church-specific Heritage Issues

Since the reconceptualized Commission will be able to perform more assignments, it will be the best host for Church-specific research regarding heritage structures. Areas of research include history of sacred buildings, and materials to replace coral stone, historic roofing or flooring. With the Archdiocese as almost as its only "costumer", the Commission is in the position to take steps towards organizing and promoting these fields in a more efficient way in cooperation with NHCP's Materials Research Conservation Division. Ar. Becker-Ritterspach (2014) wrote: "With regard to large scale reconstructions (having in mind the limited funds available) it will be unavoidable to develop an artificial substitute for coral stone. The design of such a product should not be left to the contractors. It became clear that the data found at the examples show a wide range of chemical and physical variation. Therefore, tests on the site will be unavoidable in order to collect own experience. It is recommended to make full use of the offer of NHCP to assist in material research of monuments".

1. The Archdiocese possesses site equipment for maintenance only. There must be a person appointed in-charge of this equipment.
2. Structural Engineers should also be part of the Commission.
3. The decision making mechanism of the Commission should allow "veto" of the professional member whose field is in question.

In exchange, members who are experts of another professional field, should limit their interventions to fields where they are not experts.

Resource persons, Architect Java and Monsignor Pono, reported that it became a problem when both the Church and the Government wanted to put up markers on heritage buildings at the same time. In many countries, both markers are present on ecclesiastic buildings. The researcher confirms the decision to provide permanent markers.

C. Training

Training initiatives should be continued. A seminar for municipal and city engineers under the jurisdiction of the Province of Cebu has been completed as the first of a series of training-workshops jointly sponsored by CACCHC, the Province of Cebu and the National Commission for Culture and the Arts (NCCA) on May 21, 2014. The next seminar will be for private engineering contractors in Cebu, followed by a third batch for priests. The Commission should also continue its publication activities.

V. Conclusion

This study and the achievements in the years after its completion serve as testament to the fact that the Archdiocese of Cebu has made a lot of efforts to open the discourse on heritage issues. Since this kind of openness is relatively new, the study serves as a breakthrough. Msgr. Pono, the first leader of the Commission had the difficult job altering the consciousness towards acceptance of the seriousness of heritage issues and experts' opinion. Under his successor Fr. Brigoli, who is professionally qualified to undertake such discourse, the cooperation between owner (Archdiocese), authorities and experts (USC-CHERISH and others) became efficient. The recommendations of the study have been partly accepted. Heritage conservation now enjoys a better financial support from the Archdiocese. Although there is still much room for improvement, the present study is a contribution to reducing mistrust among stakeholders, which used to be dominant before. The Commission, in the meantime, was successful not only in planning and implementing building conservations, but also in issuing new documents. The most important accomplishment is the newly launched book of Ar. Melva Java, FUAP, and Dr. Raimund Becker-Ritterspach, "Illustrated Manual for the Repair and Maintenance of Spanish Period Structures in the Philippines" (in 2018). This work is based on the work of both the Commission and University of San Carlos, published by USC Press in Cebu City. This kind of heartfelt cooperation is a proof of further efficiency. The Archdiocese of Cebu's experience could encourage other Philippine provinces to aim for a better cooperation of all heritage stakeholders.

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Appendix

(Examples to: ***3. Misconceptions and Hazardous Practices in the Archdiocese of Cebu***)

- ***Unprepared decisions, in particular in structural issues which require participation of structural engineers with experience in heritage conservation and sensitivity towards architecture and theology.*** The expert wrote: "At all sites visited there was no or not sufficient cooperation between Architect and Structural Engineer (SE)."
- ***Lack of respect for the existing structure.*** Average practitioners of structural engineering might not be sensitive to the complexity of heritage structures which have used today unknown materials and have undergone numerous alterations.
- ***Ignorance of traditional techniques***, like "use of binding stones at intervals or horizontal pinning along the courses. This practice will help to avoid that large parts of *stone-veneer* will peel off from the *mamposteria* core."
- ***Building constructions unknown to contemporary engineers and architects are misunderstood and neglected.*** Typical for this are the buttresses. Since buttresses are not needed in new buildings, their role is frequently underestimated in old buildings. The expert commented these parts in Samboan.
- ***Unprepared removal of debris.*** The expert warned contactors that "heavy debris has to be removed from the upper level. This will lead to all types of vibration, even shocks if heavy blocks touch other parts of the belfry. As a result the remains suddenly can break down."
- ***Use of untested finishing materials, even on Sto. Niño Basilica in Cebu City:*** "The closing of cracks with car-repair plaster is a doubtful procedure anyhow. Material testing of the plaster (gypsum?) would be advisable. It is also advisable to check the bonding of the plaster to its ground."
- ***Use of incorrect painting and plastering materials.*** "Plaster should be applied on lime base, not with Portland cement as apparently used at the nave walls."
- ***Ceilings*** "had been repaired and altered without retaining the original details."
- ***Lacking replacement for deteriorated gutters and spouts.*** "Missing gutters and spouts have to be completed at the eave façades to protect the masonry from water attack."
- ***Ignorance of traditional roofing technologies.*** In Boljoon, "the roof cover was replaced by GI sheeting and decorated with tile roofing."
- ***Electrical wiring with no respect to the historical decoration.*** (Becker-Ritterspach, 2014)
- ***Heritage Law is being violated.*** Although many stakeholders hope that laws will not be executed, a growing heritage awareness (caused by globalization and international trends) in the Philippines makes it obvious that offenders will be punished as it is stated in the National Cultural Heritage Act. (Congress of the Philippines, 2010)

Figure 2. Samboan Church showing the lack of maintenance.
Source: Becker-Ritterspach. (2014, June 7. Visitation at Cebu Province.

Figure 3. Cebu Cathedral.
Source: Photo c/o the author.

Closing Dedication

The researcher is very thankful for, at least partial acceptance of the findings of the research which contributed to the present success of conservation works in the Archdiocese. May this research continue to strengthen the efforts of the Commission towards a more professional heritage conservation and may its recommendations make the work of the Commission more efficient in assisting the Archbishop of Cebu in his decisions. The researcher dedicates this work to the Archbishop of Cebu and the indefatigable activists of the Commission.

Landscapes of Mobility in Metro Manila's Business Districts

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Abstract

Metro Manila has witnessed the blossoming of several business districts outside its historical core. Located mostly near the EDSA ring road and South Luzon Expressway, these business districts have become powerful attractors of office workers and shopping mall patrons, hence generating heavy commuter flows. Current urban dynamics reinforce the role of these districts as engines of growth for the whole country and define Manila as a multi-centered urban region. In addition to Ermita/Malate area, five major districts of Metro Manila are identified: Makati CBD, Bonifacio Global City, Ortigas, Alabang and the new Quezon City CBD (Vertis North) that is recently developed. These districts are not just office and shopping centers but they are also spaces of transit and transfer, whose residential component is growing with upper-end high-rise condominiums. There is indeed an expanding gap between higher-end "quality" vertical living that excludes the poor and their transport mode, and the horizontal city of the poor living in slum-like areas poorly served by many transport modes. Private developers appear to play a major role in the re-shaping of the metropolitan area, both by their new "townships" currently under development and with their influence in the design of future enhancements of the metropolitan rail system.

Keywords: Edge Cities, Metro Manila, Philippines, transit-oriented development

I. Introduction

Since the 1960s, urban sprawl has greatly expanded the sizes of metropolitan areas around the world and led to the rise of suburban business clusters – a phenomenon well studied in the United States, with a rich vocabulary trying to describe it: "outer cities" (Muller, 1976), "new downtowns" (Baerwald, 1978), "suburban clusters" (Baerwald 1982), "suburban nucleations" (Erickson & Gentry, 1985), "technoburbs" (Fishman, 1987), "suburban minicities" (Muller, 1981; Spain, 1988), "suburban downtowns" (Hartshorn & Muller, 1989; Relph, 1991), and many other names. The catchiest appellation was coined in 1991 by *Washington Post*'s reporter Joel Garreau, when he published his famous book "Edge City" (Garreau, 1991), describing islands of high-rise buildings in a sea of low-rise residential subdivisions. (Fujii, Yamashita & Itoh, 2006).

These urban regions or "city-regions" (Scott, 2001) consist in specific and somewhat independent "urban realms" (Vance, 1964; Hartshorn & Muller, 1989) linked by major transportation lanes, most often circumferential highways/freeways. These "galactic metropolises" (Lewis, 1983) are best represented by Los Angeles (Scott, 1988; Gottdiener & Klephart, 1991), up to the point that a "Los Angeles school" of urban thinking and theory has replaced the previously dominant "Chicago school" (Scott & Soja, 1996; Dear & Flusty, 1997; Abbott, 2002; Dear, 2002), even if some authors also recognize Atlanta (Wheeler, 1986; Fujii & Hartshorn, 1995), the Dallas Metroplex or Phoenix as good examples of polynucleated urban regions.

Multi-centered metropolitan structures have also been recognized in Australia, Europe and Japan (Davis & Perkins, 1992; Dieleman & Faludi, 1998; Lambooy, 1998; Kloosterman & Musterd, 2001). Tokyo, in fact, has been described as a good example of a polycentric metropolis, with many subcenters (Marunouchi, Ueno-Asakusa, Ikebukuro, Shinjuku, Shibuya, Shinagawa) located alongside the Yamanote Loop circumferential rail line: business, shopping and entertainment districts have risen around and above the train stations, both as a result of the strategies of private interests and the concerted planning effort of Tokyo's authorities (Sugawara, 1995; Lecroart, 2002; Saito & Thornley, 2003). In Hong Kong, the MTR has been a major stakeholder in the design and development of new towns, with a smooth integration of transportation, shopping and apartment housing in a pattern of intensive land use (Lau, Giridharan & Ganesan, 2005; Cervero & Murakami, 2008, 2009). The same patterns may be

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observed in Singapore (Sim, Malone-Lee & Chim, 2001). The rise in land and property values around transport nodes allows the transportation side to be adequately financed (Enoch, Potter & Ison, 2005) for quality commuting services.

Would these concepts have some relevance in the high-density context (Barter, 1999) of Manila? The Philippines, most especially Manila, has an auto-oriented society (Rubite & Tiglao, 2004) like the United States, despite the huge gap in wealth between both nations. Even if Manila was the first city in Southeast Asia to implement urban rail, the heavy use of rail seen in Japan for intercity transportation is unknown in the Philippines. Many middle-class households are ready to travel longer distances to enjoy a suburban lifestyle, therefore adding to the growing flows of commuters saturating the road transport system of the National Capital Region (Rivera & Tiglao, 2005; Soehodho, 2005; Tiglao & Patdu, 2007).

This paper looks at the different business/office clusters of Manila under the angle of transportation in its automotive and urban rail forms, both of them currently marred by major problems of congestion and inefficiency, up to the point that many observers consider the transportation conditions in Manila to be detrimental to the Philippine economy in general. How are these activity clusters organized and built in relation to transport infrastructures (EDSA ring road, SLEX freeway, public rail transit, airport proximity) at the metropolitan and local scales? What places are given to local, not-so-informal (Cervero, 2007) transport modes such as jeepneys (Lim Chiu, 2008) and tricycles versus higher-end taxis and private cars? How do buses, a major transport mode in the Philippines for intra-urban as well as inter-urban mobility, fit into the accessibility of the business districts? What is the link between transport and land use (Newman & Kenworthy, 1996; Polzin, 1999; Cervero, 2013) in the nation's capital region? Can Manila develop "transit villages" (Bernick & Cervero, 1997) to reduce its vehicular congestion and improve its air quality?

The current trend of development in Manila is the rise of private mixed-use enclaves near transport nodes, creating vertical islands of quality urban life in the middle of a horizontal sea of mediocre housing and automobile congestion. It raises the question on the respective roles of public government and private corporations in the management of city life.

II. Manila's Business Clusters

At the turn of the 20th century, commercial districts close to Downtown Manila (Intramuros) had emerged. These areas (Divisoria, Avenida Rizal, Escolta, Quiapo, and Binondo) saw the rise of hotels, multi-story buildings, hospitals, schools, and banks. Downtown Manila still was the capital's only business district until World War II.

But over the next few decades, Manila's real estate industry started to look elsewhere for new land. The capital's increasing population and the Philippines' growing economy needed new business areas. The Araneta family began developing the eponymous Araneta Center, a 35-hectare commercial area in Cubao, Quezon City. Its centerpiece is the Araneta Coliseum (Arceo-Dumlao, 2015), which for a time was the world's largest domed indoor sports arena.

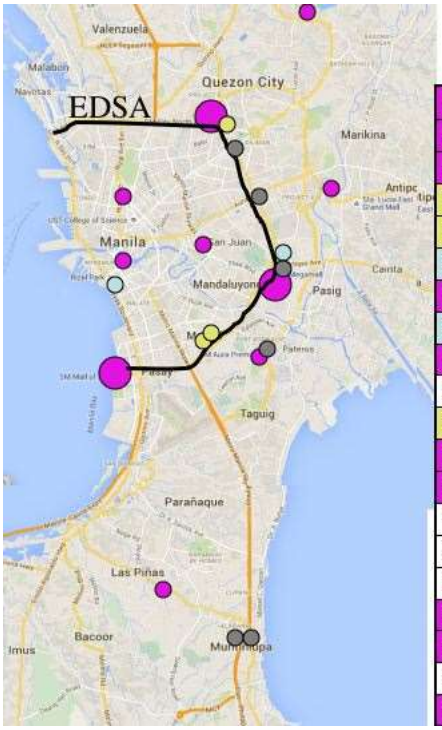
Then came Makati in the late 1960s, a project of the influential Zobel de Ayala family. Surrounded by subdivisions or gated communities, Ayala Avenue became home to the country's first true skyscrapers. By the 1970s, Makati City had become the Philippines' financial and business capital, a position reinforced in the post-Marcos years when the Ayala group also invested heavily in peri-metropolitan business parks (Koike, 1993).

Then came Ortigas Center in the 1980s, Filinvest City (Alabang, Muntinlupa City) in the early 1990s, and Bonifacio Global City (BGC) in the late 1990s. Currently, Quezon City is building a new Central Business District (CBD) called Vertis Center, which will be a major transportation hub (three urban rail lines and the main bus terminal for all routes serving northern Luzon). All these massive urban projects are now fully-fledged business districts, each housing important institutions, numerous office towers, cavernous shopping malls, and headquarters of multinational and local corporations.

A growing number of master-planned townships and business districts – also known as mixed-use projects – are proposed and built all around the metropolitan area. This building boom further intensified when the government began privatizing idle prime lands.

Approaching Manila's airport from the air, the alert traveler immediately perceives the archipelagic pattern of skyscrapers clusters of the metropolitan area, rising above a wide expanse of slum areas, industrial parks and low-rise buildings. When landing from the northeast with a right-window seat, it is easy to recognize Ortigas Center, then Bonifacio Global City with Makati City behind it, and at the distance the high-rise buildings of Metro Manila. What has developed is a Los Angeles-style extended metropolitan region with multiple cores, including in the central area where the CBDs of Makati City, Ortigas (Mandaluyong City/Pasig City) and Bonifacio Global City (Taguig City/Makati City) are edge cities that are larger than the business district of Manila City and dominated by an ethic of privatization of public space (Shatkin, 2011) in the quest for global city-ness (Shatkin, 2008; Hogan, 2012; Boquet, 2013a). In a classic dual-city contrast observed in many world cities, these areas, as in other Southeast Asian cities (Olds, 1995; Dick & Rimmer, 1998; Laquian, 2005, 2011; Shatkin, 2006), are islands of world connectedness and gentrification (Garrido, 2013; Roderos, 2013) in a sea of poverty and slums.

Figure 1. Aerial view of Bonifacio Global City (Taguig/Makati). SM Aura (left) and Market!Market! (right) can be seen at bottom, Bonifacio High Street at the center.



Major shopping malls in the Metro Manila area

SM Megamall	Mandaluyong / Ortigas	506,000 sq. m
SM City North Edsa	Quezon City	483,000
SM Mall of Asia	Pasay	407,000
Greenbelt	Makati CBD	250,000
Glorietta	Makati CBD	241,000
Robinson Place	Manila (Ermita)	241,000
SM Aura Premier	Bonifacio Global City	235,000
Robinson Galleria	Quezon City	216,000
SM Southmall	Las Piñas	206,000
Festival Supermall	Muntinlupa (Alabang)	200,000
TriNoma	Quezon City	195,000
SM City Fairview	Quezon City	189,000
SM City San Lazaro	Manila	179,000
Harrison Plaza	Manila (Malate)	178,000
Shangri-La Plaza	Ortigas	175,000
Market Market !	Bonifacio Global City	170,000
SM City Manila	Manila	168,000
SM City Santa Mesa	Manila	133,000
Nova Market	Quezon City	133,000
SM City Marikina	Marikina	125,000

Figure 2. EDSA as a shopping mall attractor.

A look at the list of the tallest buildings in the Metropolitan Manila area confirms a dual pattern of concentration/dispersion of skyscrapers in several clusters (Boquet, 2016a). Of the 50 tallest buildings, 19 are located in the Makati CBD (Roxas/Ayala), nine in Ortigas (Mandaluyong City/Pasig City), six in Bonifacio Global City (Taguig City/Makati City), and only four in the City of Manila (three in Ermita and one in Binondo/Chinatown). There are seven others in different sections of Makati City, including the newest tallest building of the country, three in the Boni area of Mandaluyong City, one in San Juan City, and so far, none in Quezon City.

These clusters of high-rise buildings are mixing high-end residential condominium apartments and office towers, both for executive functions (headquarters of Filipino corporations and Philippine offices of international firms) and for business process outsourcing activities such as call centers (Kleibert, 2014, 2015). The rapid growth of the Business Process Outsourcing (BPO) industry in the Philippines, facilitated by the designation of many areas as Special Economic Zones by the Philippine government, has spurred demand for office space (McKay, 2006; Dumlao, 2013) and accelerated the rise of skyscrapers districts that are busy at all times of the day and night with the odd-hours shifts of personnel. At the same time, shopping facilities have also grown very fast (Rau & Corpuz, 2012).

Outsourcing companies have snapped up office space in many buildings, with a high attraction exerted by the Makati CBD, sites in Mandaluyong City (Shaw-Ortigas and Boni-Pioneer), Eastwood Libis (Quezon City), the UP Technohub in Quezon City (next to the campus of the University of the Philippines-Diliman) as well as the surroundings of Mall of Asia in Pasay City and the Alabang area in Muntinlupa City. The City of Manila itself is not a major center of the BPO industry.

Despite the fact that the Philippines is still a poor country with myriads of small-scale, house-based *sari-sari* stores, Metro Manila has emerged as one of the shopping mall capitals of the world in the last 20 years. In fact, just considering the largest malls (Sameen, 2018), Manila is the only city that hosts three of the 15 biggest retail centers in the world, all run by the SM Group: SM Megamall in Mandaluyong City/Ortigas, SM City North EDSA in Quezon City and SM Mall of Asia in Pasay City.

Located mostly near the Epifanio de los Santos Avenue (EDSA) ring road and South Luzon Expressway (SLEX), these business districts have become powerful attractors of office workers and shopping mall patrons, hence generating heavy commuter flows. High-rise condominium buildings come with parking garages (Orquina & Lidasan, 2003) enticing residents to use their cars, hence demultiplying the car trips in addition to the malls and businesses traffic generation. Current urban dynamics reinforce the role of these districts as engines of growth for the whole country and define Manila as a multi-centered urban region.

III. Transportation Networks in Manila

For foreigners who are used to efficient public transport, wide roads and a general sense of order, Metro Manila's transportation system appears chaotic. With massive traffic jams, any trip becomes an exercise in patience and being on time for an appointment is a rare luxury for Metro Manila's 12 million residents. Meanwhile, frenetically driven jeepneys and buses, overflowing trash, and noisy, smoke-belching tricycles make the streets quite hazardous to pedestrians except in rare areas such as City of Makati's carefully planned CBD (Galingan, 2009). Sidewalks, when they exist, are usually narrow, poorly maintained, and often crammed with street vendors. The metropolitan area has basically ignored bicycle lanes and walking on its streets is exposing oneself to heavy pollution with health consequences such as asthma.

The general appearance of chaos belies the efforts at rationalizing the circulation within the metropolitan area. Authorities have developed a semi-radio concentric network of automobile thoroughfares and built an urban railway network, while trying to regulate and differentiate the use of the different road transport modes. The most important roads of Metro Manila are organized around a set of radial and circumferential roads.

The North-South Roxas Boulevard, first developed under the 1904 Burnham plan alongside the shores of Manila Bay, is the central element of Radial Road 1 (R1) that leads south to the province of Cavite. Parallel to it, slightly inland, Taft Avenue (R2) also links the old part of Manila to Pasay City, Las Piñas City and several Cavite localities. R3 (Sergio Osmeña Highway) starts from Manila leading to the south through Makati City then towards the provinces of Laguna and Batangas as a large modern toll road highway, SLEX, opened in 2006. R4 has not been completed. R5 leads from Mandaluyong City (Shaw Boulevard) to the eastern suburb of Antipolo City in Rizal province. R6, also known as Aurora Boulevard, is an eastbound road in Cubao, the southern district of Quezon City. Radial Road 7 (R7) starts from the neighborhood of Quiapo in Manila and leads towards the northeast, under the successive names of España Boulevard, Quezon Avenue, Commonwealth Avenue, and Quirino Highway. It was designed as the central axis of the new capital Quezon City in the 1940s (Boquet, 2016b). Built in the 1960s, its Commonwealth Avenue section beyond Quezon Memorial Circle serves as the largest urban artery in the whole Philippines, with up to nine lanes of traffic at each direction. Quezon City was then the capital of the Philippines, and embassies were to be put up on both sides of that stretch of highway. It is also the most accident-prone road in the country. Leading north of Manila, R8 becomes the North Luzon Expressway (NLEX) leading to Angeles City (Pampanga) through Bulacan province, while R9 (Rizal Avenue, McArthur Highway) runs parallel to it further west. The coast-hugging R10 has not been really developed.

The circumferential EDSA (Boquet, 2013b), first developed in the 1940s to provide access to the new Quezon City from the South (Makati City, Pasig City, and

Mandaluyong City), has become the busiest highway in the metropolis. In the scheme of roads, this 24-kilometer stretch of highway running from McArthur Highway in the north (Caloocan City) to Roxas Boulevard in the south (Pasay City) is known as C4 (4th Circumferential Road) and cuts across Quezon City, Mandaluyong City and Makati City, while bounding Pasig City and San Juan City. When it was completed in 1954, it was approximately marking the limits of the built-up area. Its southwestern end, near the shoreline of Pasay City, is the site of the gigantic SM Mall of Asia. Other segments of roads within the EDSA perimeter have been designated as C1, C2 and C3, even if they serve more as local roads than beltways, a role assigned to an outer ring highway (C5) that also serves as a major link between the cities of Taguig, Pasig and Quezon City at the eastern to northern side of the metropolitan area up to Caloocan City further north. A C6 outer beltway is currently under construction. It will entirely bypass the Metropolitan Manila area for traffic between North and South Luzon.

Most transport investments in Manila have been done for the development of road transportation. Boulevards have been widened and have become highways. A major project currently underway is an urban freeway linking SLEX and NLEX through the center of Manila (Gamil & Camus, 2014; Esplanada, 2014). Pedestrian overpasses have been built, somewhat belatedly, to allow the crossing through these thoroughfares, often becoming eyesores cutting through the urban fabric. The clear choice of road-based transport in the post-war Philippines, helped by the lack of trains and the abundance of buses and jeepneys, has led to heavy congestion and timid efforts to regulate traffic. Most jeepney routes avoid EDSA, except on its southwestern and northern ends, but make heavy use of the radials. Metropolitan and provincial bus companies are the top users of EDSA, which concentrate many private bus terminals especially in the Cubao sector of Quezon City. Tricycles and *pedicab* services, banned from the largest thoroughfares, are limited to specific sections of municipalities and serve mostly as feeders for other modes of transport from the narrow streets of neighborhoods where other vehicles have no physical access.

In comparison to other Southeast Asian countries' metropolises (Bangkok, Jakarta, Kuala Lumpur), Manila's motorization rate has remained modest (Senbil, Zhang & Fujiwara, 2007). Motorcycles, which have become a dominant mode of transport in countries such as Vietnam, are relatively few in the Philippines. There are in fact more for-hire tricycles than individual motorbikes.

Urban rail transit has been slow to develop. Only in 1980s did the authorities recognize the need for an alternative to road-based transportation. Three standard-gauge lines have been built so far, all alongside major thoroughfares.

Light Rail Transit (LRT) Line 1 is a fully elevated north-south route that opened in December 1984 (7 kilometers) and June 1985 (8 kms). One of the first urban rail lines in Asia outside of Japan, anterior to Singapore's MRT or Taipei's Metro, it runs from North to South along Rizal and Taft Avenues (15 kms, 18 stations). The capacity of the line was increased in 1998. The line runs seven meters above the street on a concrete structure designed to withstand earthquakes. The average station distance is 825 meters. Stations are only accessible via stairs, with no elevators or escalators. Monumento (north terminal), Central, Gil Puyat, EDSA and Baclaran (south terminal) stations serve as main transfer nodes to buses and jeepneys. In 2010, the line was extended for five kilometers east of Monumento along EDSA between Caloocan City and Quezon City. There are plans to extend the line to the South.

LRT 2 runs from northern Manila (Santa Cruz area) in the west via Quezon City to Pasig City at the east. The line is elevated except for Katipunan station, which is located underground. Construction of this line started in 1998 and it runs along Recto Avenue, Magsaysay and Aurora Boulevards. Although called LRT, this line uses heavy rail metro vehicles. A footbridge linking the LRT 2-Recto station to the LRT 1-Doroteo Jose station opened in March 2005. LRT 2 is the less crowded segment of metropolitan rail network (196,000 passengers/day in 2013).

MRT 3 (Metro Rail Transit, officially called Metrostar) runs elevated along the EDSA ring road (except for the underground Buendia and Ayala stations). The central section opened on 16 December 1999 while the southern section, which connects to LRT 1, followed on 20 July 2000. The total length is now 16.9 kilometers. The MRT trains are air-conditioned… when it works! This line is over-used (up to 600,000 passengers every day), under-sized (trains, platforms, stations) and under-performing (speed, schedules) with an increasing frequency of incidents and insufficient maintenance in a wider context of corrupt management regularly covered by the Philippine press.

Rail transit in Manila is somewhat connected with roadside modes since most bus stops, as implemented by the Metropolitan Manila Development Authority (MMDA), are near the metro stations as can be seen alongside EDSA (MRT 3) and Taft Avenue (LRT 1), while jeepney routes often start near rail transit stations such as the jeepney terminals in the Guadalupe area of Makati City and at Quezon Avenue in Quezon City, to name a few. Tricycles serving smaller neighborhoods can also be found near the exit of the metro stations. A good example would be the Boni Avenue MRT stop in Mandaluyong City. However, a number of issues have been identified (Koh, 2000) that need to be addressed for a better travel experience. Passengers complain about increasing walking distances and access difficulties to transport terminals, leading to discomfort and danger when loading or unloading from buses, jeepneys and tricycles. Drivers of public utility vehicles regret the lack of waiting spaces, U-turns and loading/unloading facilities. Other road users are heavily impacted in the form of increased congestion on the roads, both by poorly parked vehicles and pedestrians walking on vehicular space.

Contrary to classic Transit-Oriented Development (TOD) theory, the land use impact of the LRT 1 seems to have been quite minimal since it was built in an already well-developed part of the metropolitan area (Pacheco-Raguz, 2010). However, there have been many more urban impacts alongside the EDSA/MRT 3 corridor.

IV. Townships in Manila: A Local Version of Transit-Oriented Development

The largest concentrations of skyscrapers usually dominate major commercial areas. The best examples are in the Makati CBD (no less than three major retail centers: SM Makati, Glorietta and Greenbelt) and Ortigas Center (SM Megamall, Robinsons Galleria and Shangri-la Plaza), among others. Bonifacio Global City is developing as a major business center while expanding its shopping mall facilities: first with the Market!Market!, then the high-end SM Aura. In secondary subcenters such as Alabang in Muntinlupa City, the pattern is similar: a large shopping mall surrounded by smaller retail facilities, office towers and residential high-rise condominiums.

Almost all major malls, except those in Downtown Manila, are located alongside the major freeways such as EDSA and SLEX. Their locations are typical of American-style freeway- or beltway-oriented edge cities and seemingly good implementation of the principles of TOD, with easy access to urban rail transport like when the MRT traveler walks directly into a shopping mall such as Shangri-La in Ortigas or Trinoma Mall at the northern end of the MRT 3 line in Quezon City. Major malls are easily accessible from public rail transit in Makati City. Most malls are served by Metrorail, and also include major jeepney and FX megataxi departure areas, as in SM City North EDSA (Quezon City) or SM Mall of Asia (Pasay City). Malls and public transit development have progressed together.

However, disputes over the location of public transit stations have arisen as exemplified by the case of the planned transfer station in Quezon City, where passengers could easily transfer from the LRT 1 to the MRT 3 and the future MRT Line 7. A long battle between developers Ayala (Trinoma) and SM (SM City North EDSA) almost led to a confusing split of the transfer station in two segments: LRT 1/MRT 3 and LRT 1/MRT 7, not to the advantage of the traveling public. Private developers seem to have taken control of the urban planning in Manila, to the best of their respective interests.

Major developers are now focusing on "township" projects. These "live-work-play-learn" master-planned, transit-oriented, mixed-use (Murakami, et.al., 2005), and self-contained "mini-cities" aim to offer urban dwellers everything they are supposed to need and want. Megaworld is building McKinley West and Uptown Bonifacio, SM is working on reclaiming more land off Manila Bay and expanding the SM Mall of Asia complex, while Ayala Group is developing the Arca South (Taguig City), Makati Circuit (Makati City), and Vertis North (Quezon City) townships. Federal Land and Vista Land have also started to build townships, with the former building Metropolitan Park (Pasay City) and Veritown Fort (BGC, Taguig City), and the latter developing Vista City (south of Manila).

Today, the largest Philippine developers (Ayala, Megaworld, Filinvest, SM) are using shopping malls as flagships and anchors for their "townships" according to this "Live-Work-Play-Learn" philosophy, which is the main source of their increasing wealth today (Cardenas 2014). Partly because of the BPO connection, Philippine malls tend to have a large number of restaurant and cafe offerings, which serve as lunch venues and as enticements to hang out at the mall outside work hours. In some cases, small green areas enhance the attractiveness of the mall areas (Gilles, 2013). The demands of the jobs and the availability of leisure areas nearby make the mall/office complexes a very attractive location to live, especially considering the horrendous traffic often encountered around Metro Manila. Real estate companies have seized the opportunity to develop these self-contained vertical cities (De la Fuente, 2012), aimed squarely at expatriates and the young adults working in BPO centers, and to diversify their portfolio of tenants. Demand for middle-income residential properties remains high, due to overseas Filipino workers investing in condominiums. Gains in the residential market used to be mostly in the luxury and high-end properties advertised by Filipino actors, but the growing demand and the shortage of residential units in this sector have led to a shift among developers, who are now catering more to the middle-income sector.

Megaworld started its commercial and retail businesses when Eastwood City, in Bagumbayan, Quezon City, was established in 1999. Recognized as the Philippines' first urban township and cyberpark, it is now home to almost 25,000 condominium residents, around 70,000 BPO and office workers, and houses more than 500 commercial and retail partners. The "live-work-play-learn" model pioneered in Eastwood City is expanding around Metro Manila and across the country. The Megaworld Group, which includes its subsidiaries Suntrust Properties, Inc., Empire East Land Holdings, Inc. and Global-Estate Resorts, Inc., has integrated urban township developments in Metro Manila, Cavite, Laguna, Batangas, Cebu, Iloilo and Davao. Megaworld-built townships are already home to about 250,000 residents and 150,000 BPO and office workers. According to its website, the goal of the company is to reach 600,000 residents and 400,000 workers by 2020. Its malls and commercial centers in Metro Manila are Eastwood Mall, Citywalk 1 and 2, and Cyber & Fashion Mall in Eastwood City, Newport Mall in Newport City (located next to Ninoy Aquino International Airport Terminal 3 and Villamor Air Base in Pasay City), Venice Piazza and Tuscany in McKinley Hill (Bonifacio Global City) and Lucky Chinatown in Binondo, City of Manila (Megaworld Group, 2010).

The township concept also provides a way for developers to be part of the solution to the congestion in Metro Manila. Condominium residents need not go far to buy groceries and gifts, or watch movies. BPO workers need not take public transportation just to buy food or eat in restaurants. Within these communities, everything is just within reach, and there is no need to confront the harsh realities of life of the rest of Manila: traffic, poverty, and crime.

Figure 3. Entrance to Market!Market! in Bonifacio Global City (Taguig/Makati). In the distance, behind the Serendra residences, high-rise buildings for condos and offices.

Figure 4. Trinoma's FX terminal in Quezon City. SM North shopping mall and office buildings in the background.

Figure 5. Eton Centris (Quezon City). Efforts towards quality urban space.

These upper-end enclaves within the wild and poor metropolis are indeed sold with attractive images of quaint European settings, as exemplified by the elite "The Florence" complex in Bonifacio Global City: "*Imagine waking up each day to the aromatic scents of lush gardens, bathing under the gentle touch of the sun, relaxing in a homey café, and taking a stroll around a secluded community reminiscent of a quaint Tuscan region of Italy, inside the concrete jungle of a central business district*". This integrated urban township is a place "*where everything is inspired by the lights, sounds, and tastes of Italy*" (BusinessMirror, 2015). It includes McKinley Hill Stadium, a competition-ready football field, and a "Venice Piazza" as the anchor of the Grand Canal Mall, with Italian gondolas, as is already done in the "Venetian" mall-casinos of Las Vegas and Macau.

In the case of Eton Centris (Martin, 2013), superbly located at the intersection of EDSA and Quezon Avenue in Quezon City, the developer is keen on developing a transportation hub for clean vehicles such as electric jeepneys, while reducing the need for long-distance travel by proposing work-live-and-play facilities next to the Quezon Avenue-MRT 3 station.

Another example, the 204-hectare "Aseana City" (Reyes, 2014) complex straddling the Pasay/Parañaque border not far from Manila's airport, has attracted services firms, banks, finance houses and manpower recruitment. A major locator in this emerging-business district bounded by Roxas Boulevard on one side and Manila Bay on the other, next to the SM Mall of Asia Complex, is London-based V. Ships, a global maritime-service provider with crewing offices all over the world for filling 25,000 onboard positions a month. With Filipino seafarers experiencing the highest demand in the global market, the company established its second-largest office in Manila, complete with training rooms, engine room simulators and a culinary school to prepare Filipino sailors.

It appears that suburban Manila's many centers share some characteristics with US edge cities, among them Washington DC edge cities. In 2013, the consulting group Jones Lang Lasalle (Salazar, 2013) has identified three major "Central Business Districts" (CBD) – Makati, Ortigas and Bonifacio Global City – for the Metropolitan Manila area and no less than 26 Emerging Urban Districts (EUD). These EUDs are located in Quezon City (UP Technohub, Eton Cyberpod Centris, Eastwood City, Araneta Cyberpark, Vertis North, Fairview Terraces), San Juan City (Greenhills Redevelopment), Pasig City (Rockwell BPO Complex), Makati City (Rockwell Center, Century City, Circuit Makati), Mandaluyong City (EDSA Central, Robinsons Cyberpark, Greenfield City), Taguig City (McKinley Hill, Arca South), Pasay City (SM Mall of Asia Complex, Newport City, Metropolitan Business Park),

Muntinlupa City/Alabang (Madrigal Business Park, Filinvest Corporate City), Parañaque City (Aseana IT Business Park, Asiaworld City), and further south in Cabuyao, Laguna (Eton City) and Calamba, Laguna (Nuvali Canlubang).

The majority of Metro Manila's clusters/townships are located alongside a few major thoroughfares: Commonwealth Avenue in Quezon City in the northeast, South Luzon Expressway in the southern part of the metropolitan area, and most of all EDSA, the semi-circumferential highway doubled by the MRT 3 mass transit line. Most of the real-estate boom so far has occurred in the eastern and southern parts of the metropolitan area, as Ninoy Aquino International Airport is located at the border of the cities of Pasay and Parañaque on the southern side.

The North side developments have been few: cities of Caloocan, Malabon, Navotas, and Valenzuela seem to be on the "wrong side" of the metropolitan area. This may be changing with the announcement of "The Cloverleaf" (Andolong, 2015; Austria, 2015; Ermitanio, 2015) in Balintawak, Quezon City at the junction of EDSA and North Luzon Expressway near the Caloocan City border. Thirty four percent of the 11-hectare mixed-use development, which used to be a textile mill property, will be assigned for residences (two towers totaling 2600 units), while 62 percent will be for retail and office space, including a 40,000-square meter shopping mall. The Ayala-developed project will also include a hospital and a landscaped pedestrian promenade. The whole project is set to be realized in just five years.

These townships represent oases of urban quality at the local scale. However, their proliferation indicates that metropolitan planning in Manila may be no more than an addition of separate "pockets of development" run by the private sector, rather than a well-designed pan-metropolitan master plan. Developers are able to revitalize locally some derelict neighborhoods and provide quality middle/upper class-friendly accommodations. However, their for-profit concern does not deal adequately with the plight of the millions of poor who live in slums (Lucas, 2005) amidst the stench of garbage-covered waterways. The real estate industry and the public planning authorities have not yet been able to work together on a common development platform for Greater Manila and its inhabitants (McLang, 2014).

V. Conclusion: Sustainable Urban Development in Manila?

Manila is a heavily polluted city suffering from many ills (Boquet, 2014a): frequent flooding, inadequate housing, traffic congestion, urban sprawl accompanied by a growing fragmentation of social space (Connell, 1999; Choi, 2016), excessive trash in the streets and rivers, dirty water, high levels of poverty symbolized by squatter settlements and widespread street begging. By many aspects the metropolitan area fails on the traditional indicators of sustainable development. Population continues to grow, the number of vehicles continues to rise, and the expansion of the urbanized area continues to widen. If we can clearly find some logic at work in the structure of the urban fabric and of its transport network amidst the chaos, there are many domains where to improve to make Manila a city that is enjoyable to live in. Not enough green spaces (a major exception being the University of the Philippines campus), almost no space for bicycles, and highly pedestrian-unfriendly streets with high levels of accidents are impacting pedestrians (Leather, et.al., 2011). The management and governance of the metropolitan area under the umbrella of MMDA (Boquet, 2014b) appears insufficient in view of a rampant corruption of many in all domains of life, and of the entrenched interests of powerful mayors in their respective cities. The forces for better quality urban spaces appear to be at this time private developers who create oases of quality urban space while the rest of the metropolitan area remains mired in difficulties observed in other developing countries.

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Pedestrian Environment Optimization of Xiaobailou District of Tianjin

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Abstract

Promoting pedestrian activities in cities is an important green transportation approach to mitigate negative modern urban problems such as traffic congestion, air pollution, as well as health issues like obesity. The efficiency of the pedestrian environment connected to an urban transit station is significant for green urban transportation approach. This paper focuses on the pedestrian environment around subway stations and investigates shortcomings on walkability of Xiaobailou District of Tianjin. The research team introduces theoretical findings on walking accessibility and preferences to support urban design applications in Xiaobailou District within the pedestrian accessible scope of the subway station. This paper illustrated spatial phenomena and optimizations from the pedestrian flow system, facilities, street boundary, road cross sections, and so on for improving pedestrian environment. These efforts will create better accessibility to the metro station and consequently improve peoples' preference of taking subway for urban transportation.

Keywords: pedestrian environment, metro station, land use, urban design

I. Introduction

Due to the rapid development of private cars, there have been more and more urban problems that occurred such as traffic jams, air pollution, excessive road widths, less walking spaces, etc. Different low-carbon approaches such as green traffic, transit-oriented development (TOD), and New Urbanism have been launched and investigated. Public transportation approaches like metro systems are considered among the most important solutions.

The development of metro stations in China is very fast. From 2009 to 2015, there are 25 cities that put their metro systems in use. However, problems occur in the daily usage of the systems, resulting in low use rates caused by poor accessibility and inconvenient linking with the environment (Zacharias & Xu, 2007; Ng, 2014). For example, the rough and narrow walking spaces occupied by cars and squatter settlements, together with unreasonable linking with corresponding land use, could not provide pedestrians a safe, connected, and comfortable environment (Lu, et.al, 2009). The series of problems on the built environment is a key issue that must be addressed to promote the accessibility of metro station. Therefore, creating guidelines for urban planning and design of pedestrian environments around metro stations is necessary.

Accessibility is one of the most important indices to measure service range of metro station by indicating the force between station and destination (Ingram, 1971; Geurs & van Wee, 2004). Built environment and pedestrian characteristics such as age, gender, preference, etc. are deemed the main factors which will have influence on the force—a key for accessibility (Geurs & van Wee, 2004). Since accessibility is an abstract concept, it can be drawn from survey of pedestrian behavior—pedestrian flow, walking distance, walking time, special behavior, etc.—which are the actual performances of accessibility. This paper concentrates on the built environment so the pedestrian characteristics will not be discussed.

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Built environment stresses the reality of the environment in cities—society, culture and spaces—where people live in. It includes land uses, buildings, residential activities, transport infrastructure and designs to the entities (Saelens & Handy, 2008). Researches from subjects of urban planning, transportation, environment behavior, and public health have concluded that built environment has quite an influence on pedestrian behavior (Owen, et.al, 2004).

To understand the relationship mechanism and for guidance in urban design around metro station, this paper studied the relationship of pedestrian system and built environment around Xiaobailou metro station in Tianjin as a case study by investigating the influence of land use, street characters, and facilities of the built environment on pedestrian behavior.

II. Literature Review

In developed countries, researches on built environment and pedestrian behavior mainly concentrate on discussions on land use and transportation to reduce cars' driving mileage and to promote the use rate of public transportation (Wilson, 1971). TOD is a developed theory and has a series of plans for central commercial district, residential area, open space, street and transportation systems, walking and bicycle systems, etc. (Peter, 1993). To make the integrated objective built environment measured more subjective, the Theory of Planned Behavior (TPB) is used to help in understanding the influence of the built environment on walking. TPB questionnaires can identify perception, cognition, and preference that affect behaviors (Lin, Sun & Li, 2015). The 3D (density, diversity, design) Theory analyzes the relation of built environment and pedestrian behavior synthetically. Density, diversity, and design are main factors of built environment that have positive influence on travel rate and behavior (Cervero & Kockelman, 1997). However, both mixed land use and high density may influence the walking environment and pedestrian behavior (Cunningham & Michael, 2004). For non-residential destinations, the route, open spaces, recreational walking, density, and distance have little influence (Saelens & Handy, 2008).

These researches are in view of measureable physical spaces to explore pedestrian behavior. But the conclusions are not enough to group a developed series and are even different from each other, not being able to get the influence mechanism clearly. Furthermore, these studied cases are from limited cities and country-specific (Badland & Schofield, 2005; Saelens, Sallis & Frank, 2003). Less of them mentioned situations in moderate and high-density cities. As cities in China are at fast developing speed, both the built environment and pedestrian behavior are greatly different from cities in former researches, resulting to less effective analyses in these studies (Lin, Sun & Li, 2015).

In China, although researches are available about built environment and pedestrian behavior, they are focused more on morphology evolution of traditional radius theory and the residential areas (Chen & He, 2013) as well as pedestrian system and transportation (Dai, et al, 2009). A research in Beijing proved that high density land use and built environment cannot reduce private car usage nor promote pedestrian flow (Yang, et.al, 2011). The researchers found out that convenience is the most important factor for pedestrian behavior, as street scale, crossing and waiting are minor factors only (Dai, et.al, 2009). The difference with developed countries is that there are a lot of characters in China, including the difference between registered urban and rural residents, commercial housing and unit community, etc., which have important influence on the pedestrian behavior in daily life (Bray, 2005; Zhao & Lu, 2010). The theory of TOD provides guidelines for commercial land use around the metro station on regulatory plan. But there are no detailed guidelines about the spatial and functional layout. With lack of theories and data supporting the topic of accessibility in China, more empirical researches of built environment and pedestrian behavior are necessary.

III. Case Study

Xiaobailou is a famous historical district in Tianjin. During 1860s to 1940s, it was a concession or territory and also served as the business center along wharfs, financial streets, and other office buildings (Figure 1). After 1990s, Xiaobailou went into depression as other business districts rose up. Comparing to other developed cities like Tokyo or Montreal, pedestrian flow in Xiaobailou—considered as the Central Business District or CBD according to the Tianjin General Planning (Tianjin Municipal People's Government, et al, 2006)—is too low. Xiaobailou District had been renovated since the beginning of 21st Century through promotion in commercial form and buildings, but only gotten little positive effects. Even after a metro station was built in 2006 to stimulate economic opportunities, it has not worked out yet as expected.

Xiaobailou Station has four exits. Exit A and D are linked with Langxiang Street, an underground shopping center with two floors that was built in 2009. People can go to the famous commercial street—European Shopping Street—through these two exits. Exit B is linked with a street corner park while Exit C is connected to a new shopping mall.

A. Land Use

From the land use map shown in Figure 1, it can be seen that there are lots of commercial lands around the station. East to the station, the commercial lands are grouped together. On the other hand, there are lands with facilities that separate commercial lands at the western part of the station. Grouped commercial lands usually have stronger power than the separated ones although they are equal in scale.

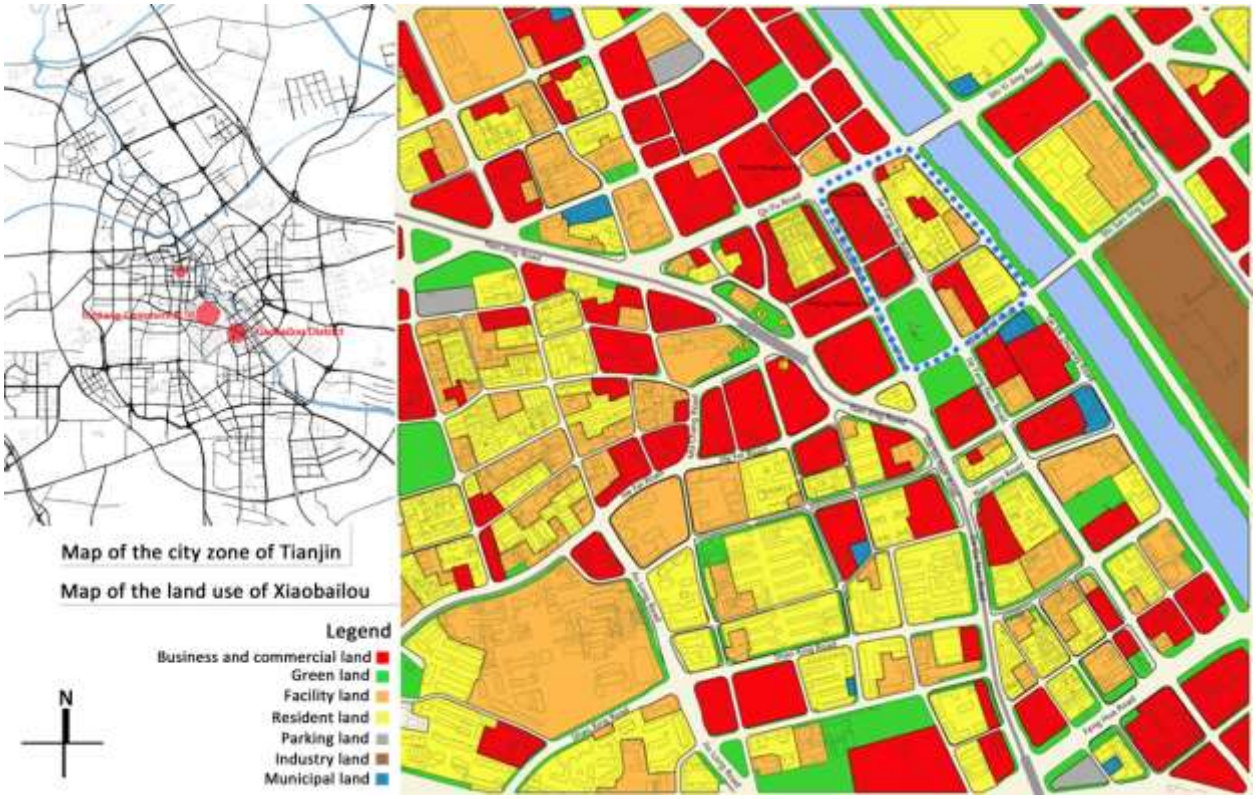

Figure 1. Location of Xiaobailou District, Tianjin.

Figure 2. The crossing between station exit and European Commercial Street.

B. Pedestrian System

Commercial land use occupies a high percentage of land within the central area of Xiaobailou. They are composed of malls and shopping streets. But the actual pedestrian system does not satisfy pedestrian needs.

- Rest space

  According to the survey conducted, rest spaces with convenient facilities like street furniture around commercial lands are limited. Even along the famous European Shopping Street, there are only a few seats without shade or landscape pieces on this outdoor street market.

- Crossing street

  The most common design for intersections is the zebra line and there are only a few footbridges. Even the intersection between the station exit and the famous European Shopping Street does not have any traffic light. Pedestrians have to compete with the vehicles when crossing the street (Figure 2).

- Sidewalk

  According to the survey on the central district, the sidewalk width ranges from 0.0 meters (no sidewalk) to 7.0 meters (mostly under 3.5 meters). Some sections are narrow (1.5 meters) and do not meet the national standards (Figure 3). Some sidewalks are occupied by cars or other facilities so people have difficulty in passing and have to walk along the vehicular lanes. Consequently, it influences the vehicular traffic.

- Signage

  There are only some directional signage and road name signs. Most of these signs are designed for the vehicular traffic but not for pedestrians. Xiaobailou District is famous for various kinds of shops, restaurants and shopping streets. However, there are hardly any signage, map or directory to show the whole district. More suitable signs should be added.

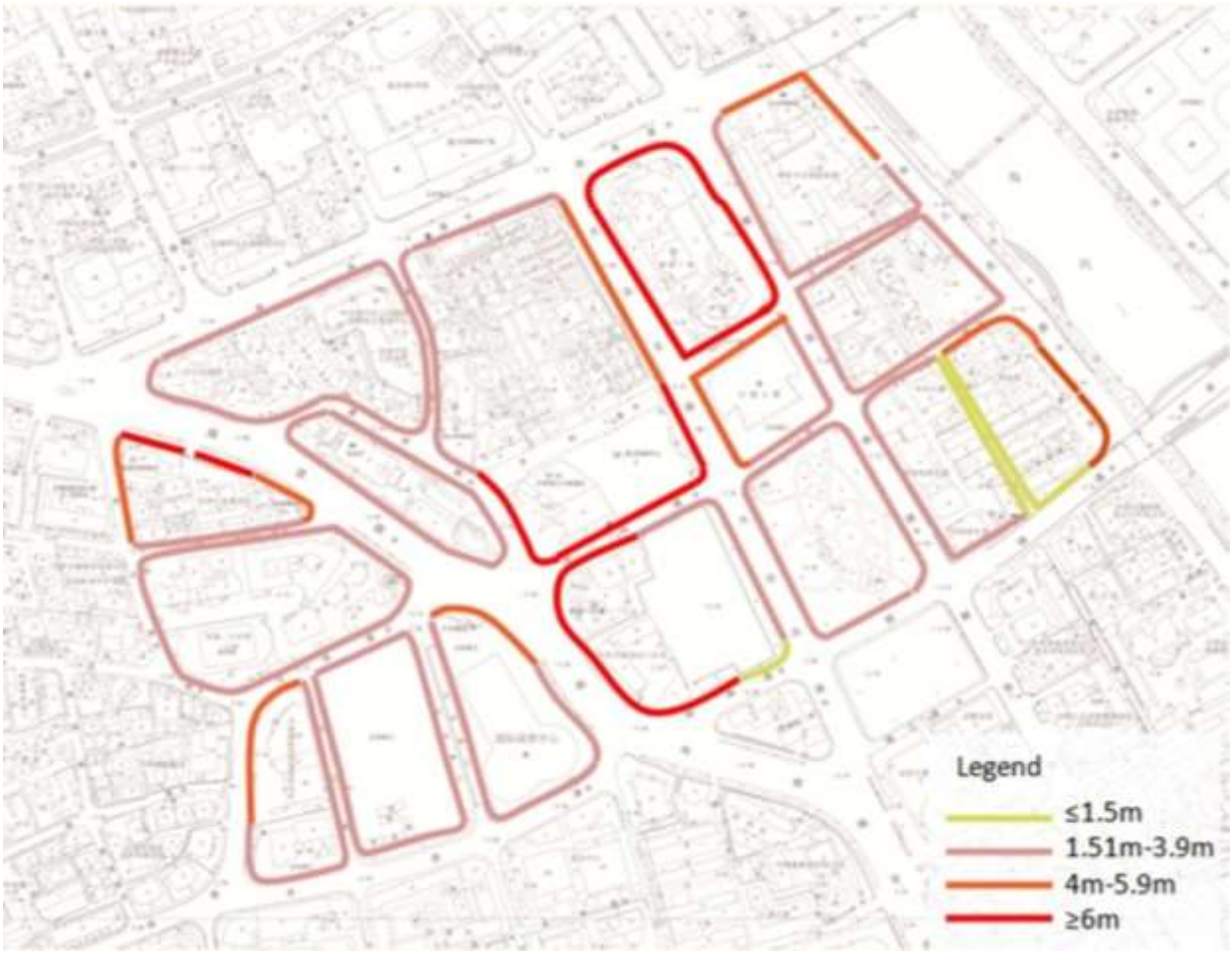

Figure 3. Width of sidewalks in the central area of Xiaobailou District.

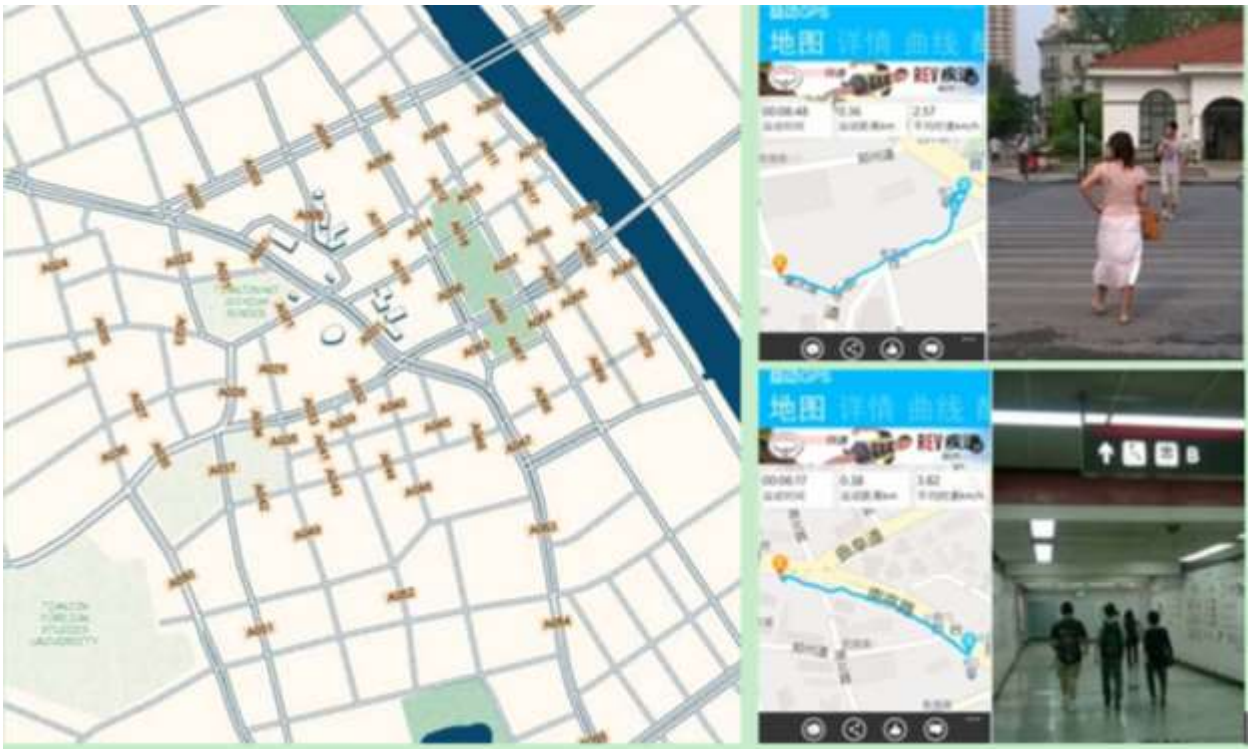

Figure 4. Survey on pedestrian flow and tracking.

IV. Research Methodology

The aim of the study is to look into the relationship between the built environment and pedestrian behavior, particularly on the subject of accessibility, and to create guidelines in designing and planning of pedestrian environments around metro stations. This paper used both qualitative and quantitative methods to analyze factors of built environment that affect pedestrian behavior.

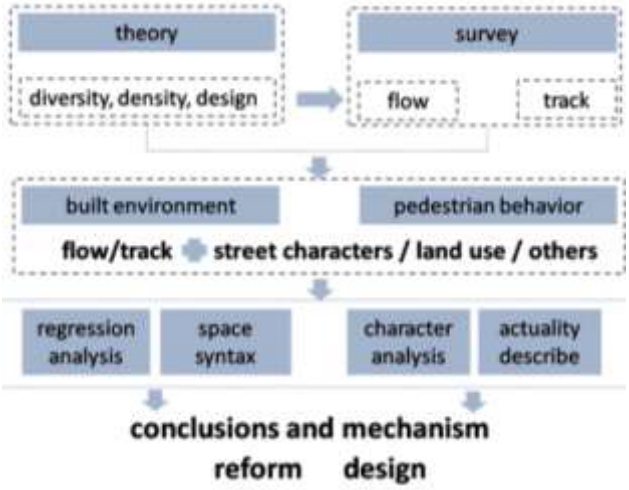

Figure 5. Research methodology diagram.

A. Study Design

This paper takes Xiaobailou District as a case study to analyze the factors of built environment that possibly influence the pedestrians. According to the literature review and actual situation, the land use, street characters, and facilities were chosen as main factors that have influence on pedestrian behavior in hypothesis:

1) The factor of land use pertains to the detailed land use around the station area.
2) Street characters include street width and the calculated Integration and Nach indices. Integration and Nach are both indices that show the connection of an area or street with the whole network in Space Syntax. Integration stands for the convenient degree to get an area or street from another. Commonly speaking, it is whether it is easy to get to an area or not. On the other hand, Nach is the degree (or frequency) of an area or street being passed by. It shows whether people like to choose an area or street to pass by with the view of the whole street network (Hiller & Hanson, 1984).
3) Facilities mainly include convenient facilities of pedestrian system. Since pedestrian behavior is complex, pedestrian flow and tracking data were used to analyze it.

Because of the variety of data, both qualitative and quantitative methods were needed. As the relationship between pedestrian behavior and built environment cannot be observed directly, mathematical models with regression analysis and space syntax were introduced. Quantitative method was used to analyze the relationship of land use and street characters with pedestrian flow. Qualitative method was used to analyze the facilities data and some tracking data that are not suitable to be parameterized. The integrated conclusions can be used in reform and designs optimization (Figure 5).

B. Data Collection

In this study, there are two kinds of data. The first part includes the data describing the three factors of built environment. The other one includes pedestrian flow and tracking data representing pedestrian behavior.

- Land use data

  According to digital map and street views, a land use map of 12 types can be obtained, including catering, shopping mall, store, residence, office, hotel, public service facility, parking, park, other station, non-high-rise office, and building site. Definition of land uses is adapted based on researches by Carmody and Sterling (1986).

- Street characters

  Street width can be measured on the survey map. Integration and Nach are calculated in Depthmap software by taking a radius of 800 meters.

- Facilities

  Survey of the convenient facilities of pedestrian system includes rest spaces, shadows, signs, supporting facilities, and so on.

- Pedestrian flow

  Pedestrian flow pertains to the number of people passing through a street section. According to the street integration map (R=800m) by Depthmap and actual situation, observation points were located. Investigators recorded numbers of automobile vehicles, bicycles and pedestrians separately in two minutes at survey points. Considering the difference of flows in different times for a single day, flow samples between 8:00-9:00, 11:00-12:00, 16:00-17:00, and 19:00-20:00 were recorded. The average and peak flow in one day were calculated afterwards. The difference between weekday and weekend was also considered and recorded accordingly (Figure 4).

- Tracking

  An investigator follows a passenger randomly at the turnstile gate and records the beginning time, ending time, destination, and special behavior during the route until the passenger enters into a building more than five minutes and does not come out. Every tracking route is put into the Depthmap to get a whole distribution map. Tracking data is mainly done to show the behavior between different people and their preferences. It also indicates the characteristics of the built environment. A total of 179 tracking routes were collected. Considering the limited amount of pedestrian tracking data, qualitative analyses were used instead of quantitative approach in the current stage (see Figure 4).

C. Data Analysis

As mentioned, qualitative method for facilities and tracking routes while quantitative method for the factors of land use and street characters were used in this study. In Depthmap regression analyses of land use and street width were used, as well as Integration and Nach for both pedestrian and vehicle flows. The value of R^2, which stands for the positive correlation between the independent and dependent variables, was obtained. Both maximum and mean flows on weekend and weekday were calculated afterwards.

From the tracking data, some strange behaviors appeared. The convenient facilities of special streets were recorded in detail, taking the European Shopping Street as an example. With the conclusions in the quantitative analyses together, the synthetically derived conclusion for the influence mechanism can be achieved.

V. Results

With the methodology and survey data, the following results were obtained:

A. Pertinence of Streets Width, Integration, Nach and Flow

With regression analyses of flow and street width, Integration, and Nach in Depthmap, the results were calculated as shown in Table 1.

According to Table 1, R^2 shows that the vehicle-flow is strongly related with the characters of streets. On the other hand, the pedestrian-flow almost has little relation with the width, Integration and Nach of streets, which means they have no influence on pedestrians.

B. Pertinence of Land Use and Flow

As mentioned in methodology, land use was classified into 12 types. Every type got evaluated and weighted. After having regression analyses, the results were tabulated in Table 2.

Table 2 illustrates the strong relationship of mean value of weekday pedestrian flow with land use. Comparing with Table 1, the relationship between land use and pedestrian flow is much higher than the relationship between characters of streets and pedestrian flow. Based on these results, the land use is an important factor for pedestrian behavior. In Figure 6, it is shown that the commercial land type usually attracts pedestrians the most.

C. Tracking

From the aggregation of 179 tracking routes shown in Figure 7, it is evident that most of the people went to the European Shopping Street and the shopping mall south of the station, with the positive scope about 350 meters in radius. Figure 8 shows the routes to different categories of destination, including home, work, service, education, catering, transfer, retail, travel, and others. Every sort of destination has a different scope. The relationship of pedestrian preference with accessibility of different destinations needs more tracking data. In the survey, there was a phenomenon that eight passengers came out from Exit D, went across the 50-meter wide street without traffic lights to the side of Exit C, and then left along the street. Three of them went back then to the east side of the street. The researchers were not able to determine why they did not come out from a nearer exit. More data may support the hypothesis that if the signs are mixed and limited, people prefer to walk more on the ground than through a more convenient shortcut underground aside from other possible reasons.

Table 1. Pertinence of streets width, Integration, Nach and flow.

R^2	*Vehicle-flow*				*Pedestrian-flow*			
	weekday		weekend		weekday		weekend	
	Max	Mean	Max	Mean	Max	Mean	Max	Mean
street width	0.551	0.631	0.745	0.740	0.129	0.092	0.139	0.095
Integration	0.607	0.666	0.595	0.570	0.067	0.033	0.007	0.003
Nach	0.411	0.485	0.435	0.471	0.087	0.055	0.014	0.462

Table 2. Pertinence of land use and flow.

	Max-weekday Vehicle-flow	Mean-weekday Vehicle-flow	Max-weekday Pedestrian-flow	Mean-weekday Pedestrian-flow
R^2	0.34	0.36	0.48	0.52
	Max-weekend Vehicle-flow	Mean-weekend Vehicle-flow	Max-weekend Pedestrian-flow	Mean-weekend Pedestrian-flow
R^2	0.31	0.29	0.27	0.35

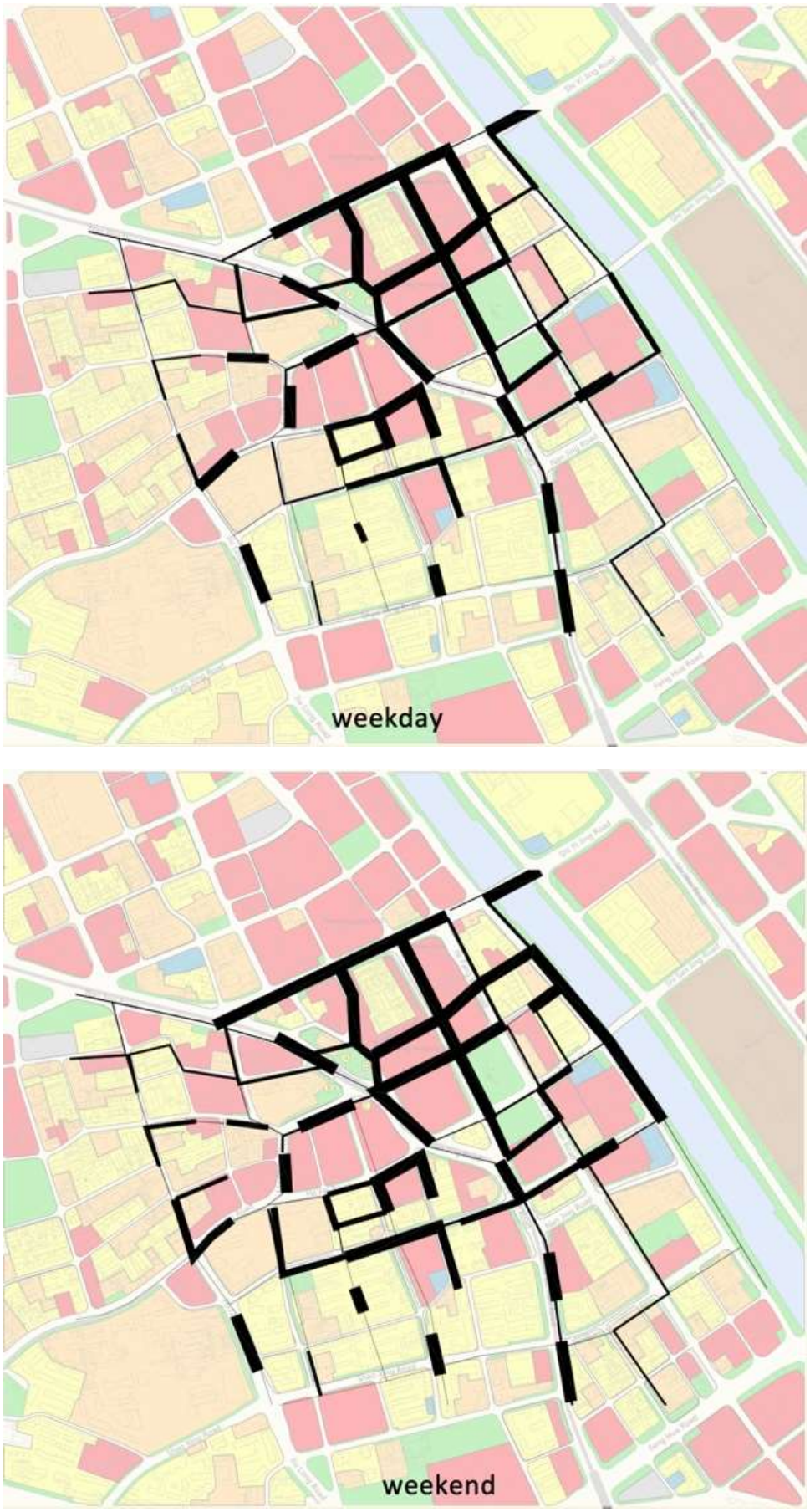

Figure 6. Peak flows of pedestrians.

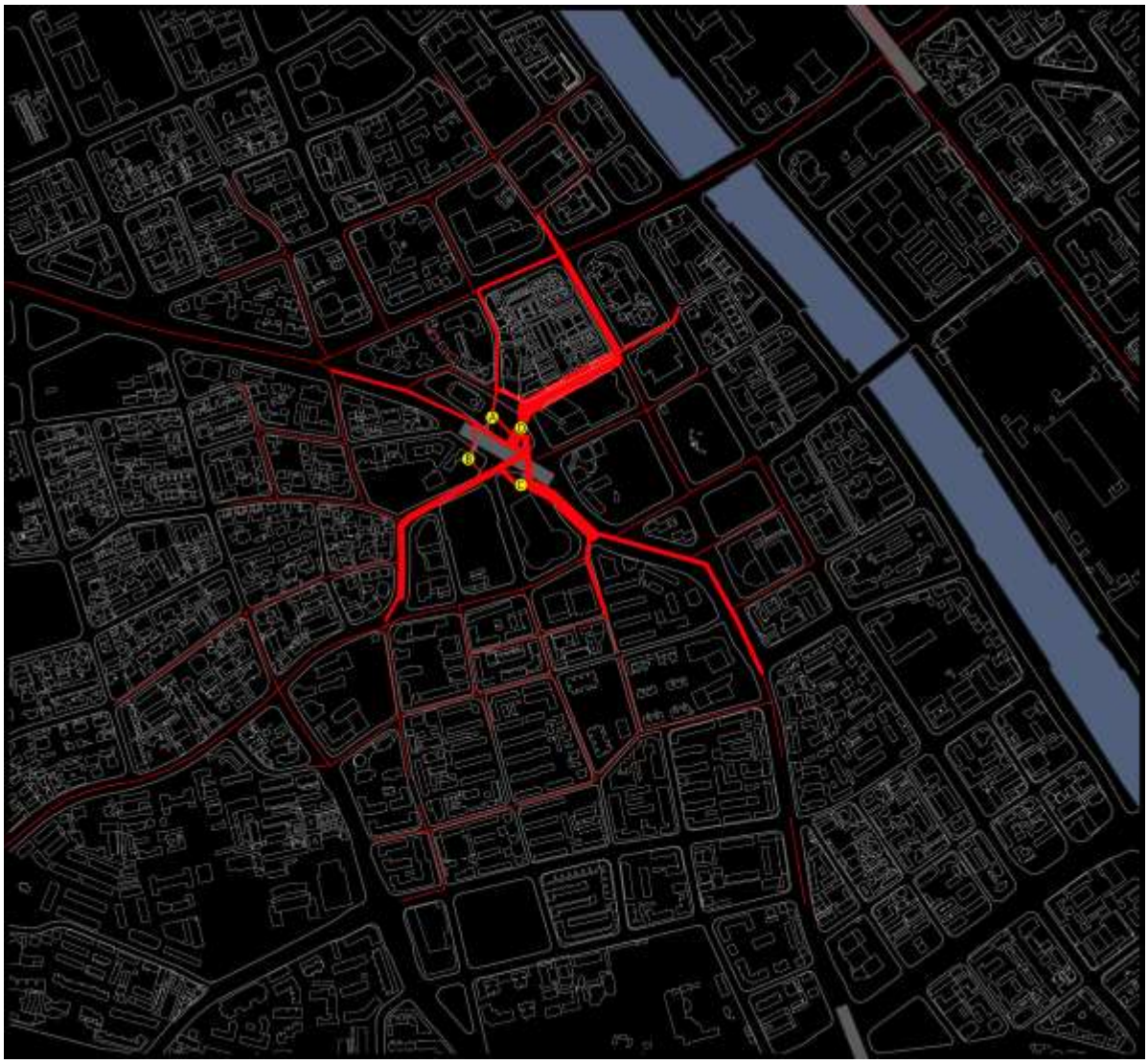

Figure 7. Aggregation of tracking routes.

D. Discussion

Based on the pedestrian flow and tracking data, a special phenomenon was recorded. There are two possible ways from the station to Friendship Shopping Mall (Figure 9), with each path having almost equal length. *Way A* goes through the famous European Shopping Street and the Haisen Plaza. *Way B* goes by residential buildings, service buildings and some stores. These two paths have totally different degrees of attraction to pedestrians, but they also do not have obvious difference on pedestrian flow number. As observed with the paths, there were some people who went to Friendship Shopping Mall via Way B instead of Way A that has more interesting features. Way B has a more quiet environment and umbrage as compared to Way A (Table 3).

Table 3. Characteristics of the two ways.

	Way-A	**Way-B**
Commercial	Shopping malls and characteristic restaurant and shops	Only some stores
Width of walking way	Single walking way, 12 meters	Double walking ways, 2.5-3 meters
Noise	From shops and pedestrians, higher	From vehicles, lower
Plants and shadows	No	Yes , with a street corner park
Length	420 meters	400 meters

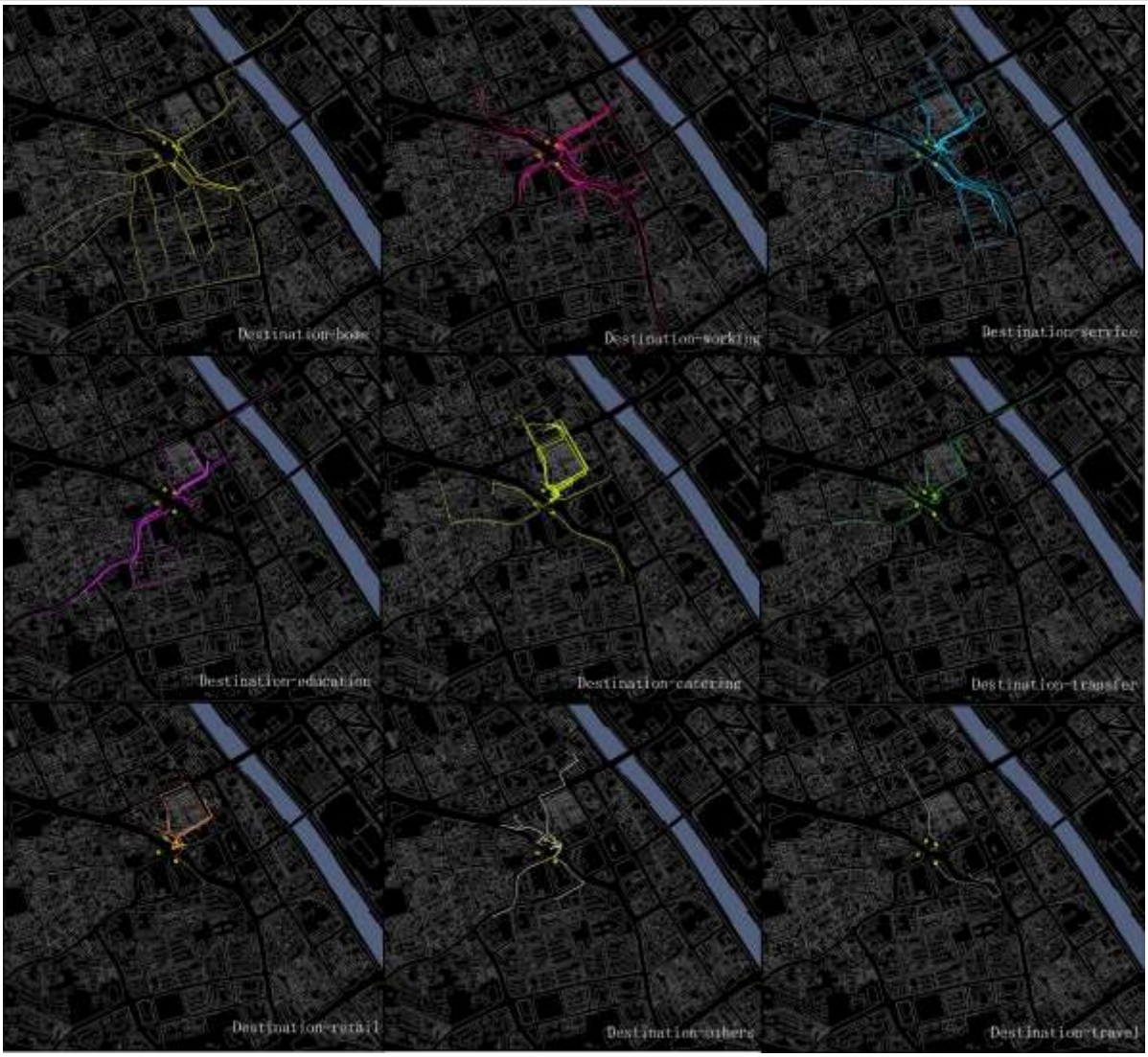

Figure 8. Tracking routes to different categories of land use.

Figure 9. Two ways from station to Friendship Shopping Mall.

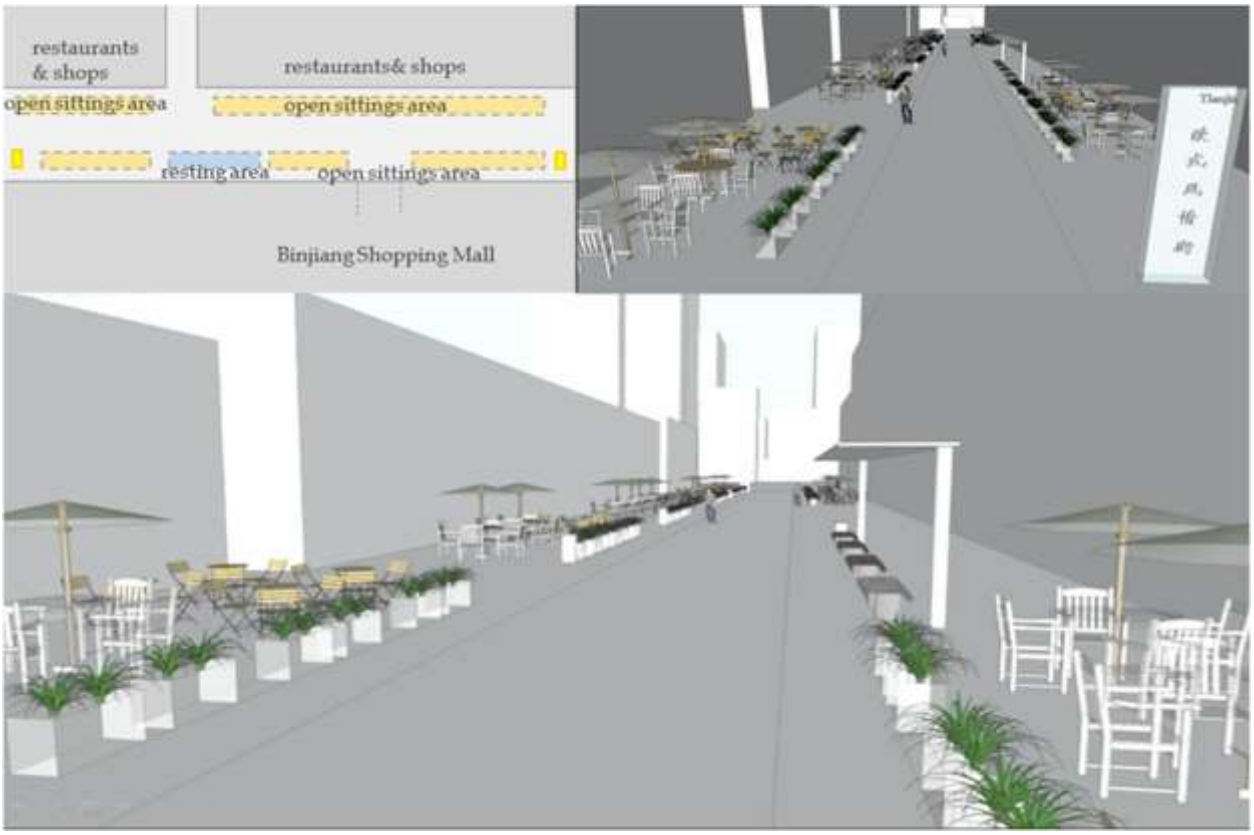

Figure 10. Proposed designs for European Shopping Street.

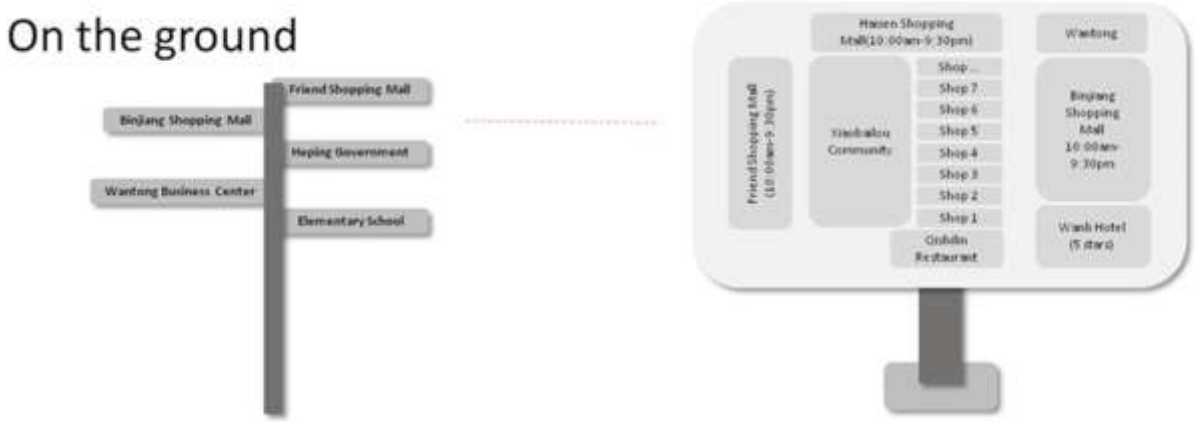

Figure 11. Signs for pedestrians.

The selection of people on Way B may be due to the comfortable environment of the path and the clear aim of the people on Friendship Shopping Mall as their destination. Except for the land use, the level of comfort can also be considered as one of the important factors that affect the preference of pedestrians.

Considering the low pedestrian flow along the European Shopping Street, more shading devices and facilities should be added to improve comfort of pedestrians, allowing people to use the pedestrian environment efficiently. Specialty stores are present at the north end of Way A, but the presence of vehicles passing by has a negative effect on the pedestrian (refer to the lower right photo in Figure 9). Serving as an important link from Friendship Shopping Mall to European Shopping Street, the path walk for pedestrians in this area needs to be widened and improved.

VI. Proposed Design Optimization for European Shopping Street

According to the results and discussion in the previous sections, the famous European Shopping Street should be improved with regards to open spaces and facilities. First, the fences and the walls of the restaurants and shops give people a strong sense of isolation. To make a friendly environment, the said fences and walls should be replaced with plants and landscape pieces. Figure 10 illustrates a solution for the open sitting areas. Second, with just a few seats and no other street furniture along the street, the resting areas with shading devices and convenient establishments should be placed (see also Figure 10).

Considering the importance of signage for pedestrians, a series of signs should be designed and installed. Around the exits, signs should be installed to direct people towards the important destinations. Poles with directional signs are also needed to be located on the ground outside every exit. At each strategic location such as the European Shopping Street, a table with information of all shops and malls is suggested to be installed (Figure 11). With all these signs, pedestrians can get the total scale of the area. It can also help them in choosing the right way.

VII. Conclusion and Future Studies

There are various factors that have influenced pedestrian behavior. According to the study, land use is one of the important factors, while facilities also have significant influence. Grouped commercial lands tend to attract more pedestrians. Different sorts of land have different effects on pedestrians. However, there is no detailed conclusion yet based on the study alone. More data are needed in order to study the quantitative and dynamic mechanisms between the factors and pedestrian behavior. The different importance of land use and facilities should be separated and valued for future studies.

Acknowledgments

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Public Market Energy Intensity and a Design of an Energy Efficient, Effective, Healthy and Vibrant Public Market Infrastructure

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Abstract

Typical public markets in the Philippines are untidy, musty, and energy inefficient. This paper addresses the evaluation framework for energy intensity and general redesign of Philippine public markets considering low energy intensity, effective, healthy and vibrant conditions, and pleasing aesthetics as primary design considerations. Ten public markets were audited and evaluated. The average embodied energy is 4.7 PJ/m² and average monthly operation energy intensity is 19.2 MJ/m². Optimizing the existing designs resulted to a 10.6 percent lower embodied energy and 64 percent lower operation energy intensity than the average of the study samples. However, considering the better criteria, an actual design has an embodied energy 10 percent more as expected but 55 percent lower operation energy intensity than the average of the study samples. It is recommended that the building code of public market include solar photovoltaic array and water heater, cold storage, bio-digester, solid waste disposal system, wastewater treatment, deodorizing and passive ventilation, and natural lighting.

Keywords: public markets; building energy efficiency; energy consumption opportunities

I. Introduction

Public market is a place, building or structure of any kind which is owned and or operated by the local government. Public market is the physical venue where suppliers and buyers make trade transactions. The Code on Sanitation of the Philippines (P.D. 856, 1975) and the Implementing Rules and Regulations to Govern the Processing of Application for Locational Clearance of Markets (Housing and Land Use Regulatory Board, 2000) have listed the basic requirements for constructing and maintaining public markets which should keep them clean, sanitary, safe and efficient. However, the current state of public markets in the country is untidy, musty, and energy inefficient. Ill-maintained facilities and poor sanitation are threatening the safety and health of the people who avail of the facilities of public markets.

This paper aims to study the energy intensities of public markets and design a public market with low energy intensity, with effective, healthy and vibrant conditions, and with pleasing aesthetics as primary design considerations. The design adheres to the mandatory specifications like public toilets, parking space, cooling and refrigerating system, and proper waste handling

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facility (P.D. 856, 1975; HLURB, 2000) and also incorporates vital requirements to enhance the facilities to be more energy and resource efficient, healthier and safer.

Having a standardized design for public market will create a big impact. Aside from addressing the present problems in congestion, safety, sanitation and efficiency, its benefits will amplify to a larger scale. A public market is expected to serve 10,000 people (HLURB, 2000) and it was proposed that every local unit of the country should have a public market down to the barangays (S.B. 1319, 2010). There are 17 regions, 81 provinces, 145 cities, 1,489 municipalities and 42,036 barangays in the country (Department of Interior and Local Government, 2017) which means a total of 43,768 public markets. In addition, 1,878 (Philippine Statistical Administration, 2015) must be added for those barangays with population exceeding a multiple of 10,000 persons. Therefore, the minimum number of public markets should be 45,646 for both existing and to be established. The new public markets are envisioned to comply with the new design and existing ones will be rehabilitated since public markets play a vital role in the local economy and used by the majority of the citizens.

II. Methodology

The research activities started by reviewing the energy management requirements of public markets, auditing the market facilities using the energy audit framework developed by Manegdeg (2013, 2015), computing, evaluating and validating the data, understanding the influencing factors to energy consumption, formulating policy for effective energy management and designing a better public market infrastructure. The research flow diagram is shown in Figure 1.

The total energy requirement of a product by accounting the energy used to produce the product, is termed as the embodied energy. Equation 1 shows the relationship of the embodied energy with respect to the energy used in manufacturing and producing the raw materials:

$$E_{embodied} = me_{intensity} \quad (1)$$

where $\mathbf{E_{embodied}}$ (MJ or J) is the Embodied Energy, **m** (mass in kg or area in m^2 or volume in m^3) is the approximate total unit in weight or area or volume of the product, and $\mathbf{e_{intensity}}$ (MJ/kg or J/m^2 or J/m^3) is the energy intensity of the material from production to actual installation. In some cases, transportation and extraction of the raw materials are included in the value of the embodied energy. Most energy intensity values of the raw material used in the construction industry are publicly available. The total embodied energy of a public market sample is then computed by summing all the products of materials with their respective energy intensities. This is given by the Equation 2:

$$E_{total\ embodied} = \sum me_{intensity} \quad (2)$$

The energy consumption is arranged into major processes known as the energy cost centers. In the study, there are seven energy cost centers composed of the following: Air Conditioning (AC) / Ventilation, Cold Storage, Cooking, Data Processing, Food Processing, Lighting, and Security. The total energy consumption per process is achieved using Equation 3:

$$E_{process} = \sum P_{rating} f_{usage} Nt \quad (3)$$

where $\mathbf{E_{process}}$ is the total energy per process, $\mathbf{P_{rating}}$ is the power rating, $\mathbf{f_{usage}}$ is the usage factor, **N** is the number of units, and **t** for average time of use.

Energy consumption of the building is primarily based on the total electricity consumed by the equipment or operations by considering the number of units, efficiencies, way of usage, and energy rating. To come up with an acceptable design, the study aimed to incorporate the most efficient equipment available in 2017. With this, it is necessary to quantify the existing design of structures and performance of equipment. To do an assessment, profiling of the physical characteristics of the facility must be taken into account. Also, analysis of the user profile and requirement must be considered to have a higher chance of acceptance.

The framework, as shown in Figure 2, uses process analysis (Manegdeg, 2013, 2015). The public market was partitioned by process. The ranking of the processes was done using Pareto for those processes with 80 percent impacts on energy consumption. The parameters influencing the process were identified using cause and effect diagrams for the prioritized processes. The actual energy audits were conducted using measuring equipment.

The existing facilities of public markets are analyzed by computing the energy load based on the volume and configuration of the stalls and market in general. Equations 4 to 8 are used in the computation of the public market energy load:

$$q_{lighting} = P_{light} F_u F_b CLF \quad (4)$$

$$q_{sensible\ load} = Gain_{per\ person} N_{persons} CLF \quad (5)$$

$$q_{solar\ entering\ the\ transparent\ area} = A(\tau I_t + N\alpha I_t) \quad (6)$$

$$q_{solar\ on\ opaque\ area} = U_w A(t_e - t_i) \quad (7)$$

$$q_{wall\ heat\ gain} = UA(CLTD) \quad (8)$$

where $\mathbf{q_{lighting}}$ is the heat generated from room lightings, $\mathbf{P_{light}}$ is the power rating of lighting equipment, $\mathbf{F_u}$ is the utilization factor, $\mathbf{F_b}$ is the ballast factor, and **CLF** is the cooling load factor. The heat generated from the occupants is accounted in the $\mathbf{q_{sensible}}$ load where $\mathbf{Gain_{per\ person}}$ is the heat gain per person and $\mathbf{N_{persons}}$ for the number of occupants. Solar heat penetration to the room is classified into solar entering the transparent area ($\mathbf{q_{solar\ entering\ the\ transparent\ area}}$) and opaque area ($\mathbf{q_{solar\ on\ opaque\ area}}$). Factors to be considered in solar heat penetration are Area **A**, transmittance $\boldsymbol{\tau}$, irradiation $\mathbf{I_t}$, fraction absorbed radiation by conduction and convection **N**, absorptance $\boldsymbol{\alpha}$, heat transfer coefficient of wall $\mathbf{U_w}$, and temperatures equivalent $\mathbf{t_e}$ and inside $\mathbf{t_i}$. For walls, the heat gain ($\mathbf{q_{wall\ heat\ gain}}$) is a function of Area, heat transfer coefficient **U**, and cooling load temperature difference **CLTD**. The formula and necessary tables are found in Stoecker and Jones (1982).

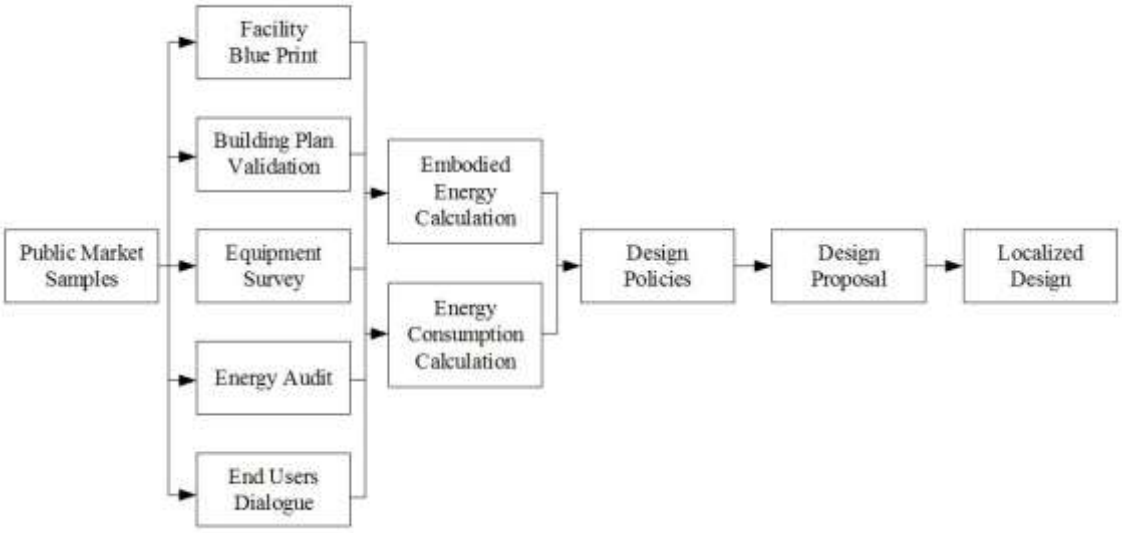

Figure 1. Research flow diagram.

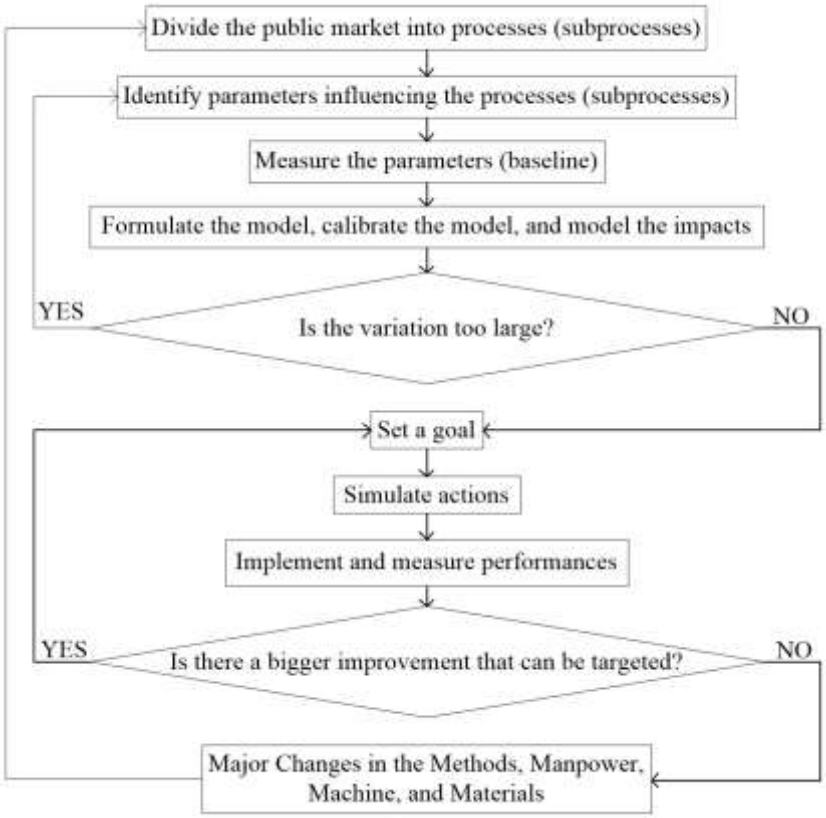

Figure 2. Energy audit framework.

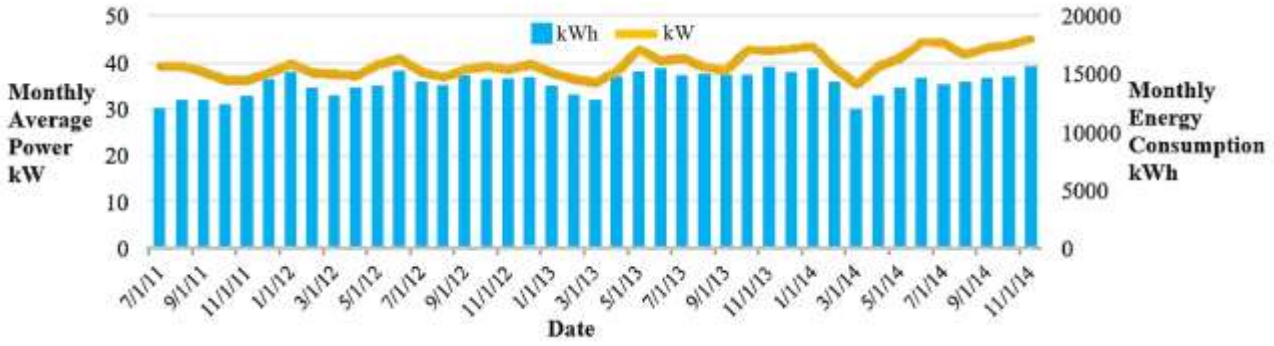

Figure 3. Average monthly energy consumption and average monthly power.

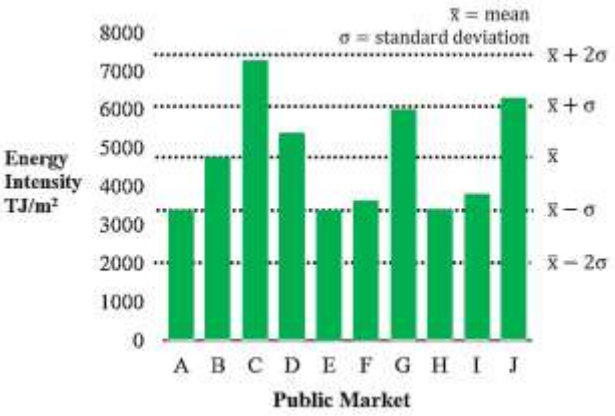

Figure 4a. Energy intensity of materials and construction.

Figure 4b. Monthly operation energy intensity.

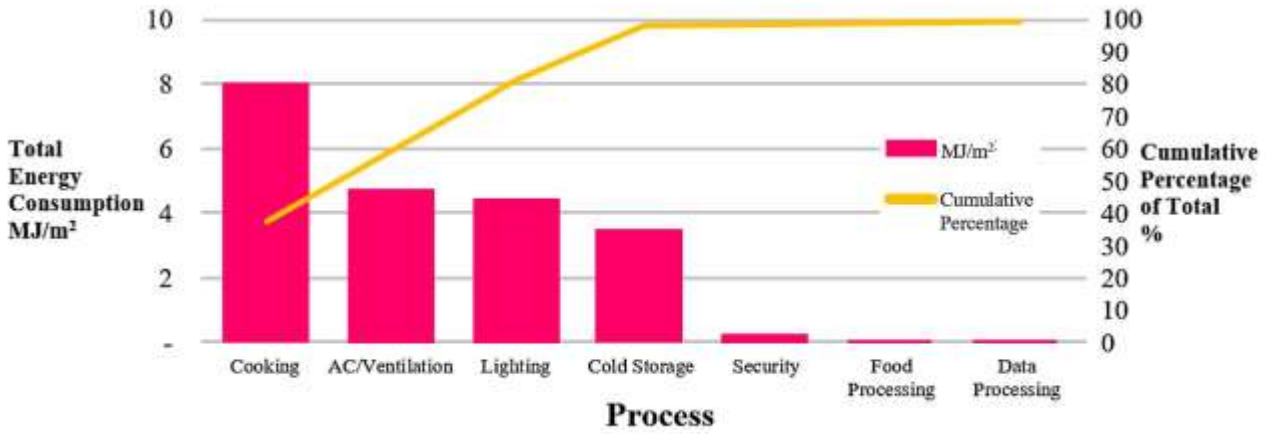

Figure 5. Pareto diagram of the processes.

The study identified contiguous area located in northern part of Quezon City and southern part of Bulacan to represent a highly and slightly populated area respectively. Sample public markets were obtained randomly in the area. Ten public markets were selected based on the criteria for inclusion as follows: all the public markets have an area between 500 to 7,000 square meters; have a dry, semi-dry and wet sections; operate every day; have permanent buildings; and have one power meter for the whole market facilities. Since there are no current standard specifications of a public market, the selected 10 public markets were used as baseline for the proposed design. The average values of specification parameters of each public market samples were computed. The proposed public market was designed as long as the embodied energy is less than 10 percent, and the operational energy expenditure is less than 20 percent.

In order to achieve the proposed design, the quantity of materials were decreased, and/or the materials were replaced with materials with lower energy intensities, and/or revised design was followed, that resulted to lower embodied energy. More energy efficient equipment were also used to decrease the operational energy expenditures. The total embodied energy and the operational energy of the proposed public market design were computed and compared to the 10 public market samples. The same framework was also used in computing the actual public market in comparison with the baseline.

The strategy to decrease the embodied energy is a function of reducing and/or changing the amount and types of materials and/or redesign. In order to come up with these measures, the designers, architects, and engineers shall strategize to adhere to the prescribed limitations of energy intensity by reduction and/or choice of materials and/or innovate on the design.

The impacts were modeled, and the model was calibrated and fine-tuned. A goal was set, the actions were simulated, and then if implemented, possible savings were calculated. The results were validated using the data previously consumed by the public markets from the local electricity provider for the last four years. The policy for effective energy management was formulated considering the level of energy savings and the ease of implementation.

Energy savings are calculated by comparing the computed existing consumption against the calculated efficient design. Equation 9 provides the formula in determining the percent savings:

$$\%\ Savings = \left(\frac{E_{current} - E_{designed}}{E_{current}}\right) x\ 100 \qquad (9)$$

where $\mathbf{E_{current}}$ is the average energy consumption of the 10 cases since there is no standard yet. $\mathbf{E_{designed}}$ is the approximate consumption of the proposed design in accordance to the recommended energy policies.

III. Results

The public markets have an average area of 58.6 percent of dry section, 21.5 percent of wet section and 19.9 percent of semi-dry section. The monthly average power in kW and the monthly operation energy consumption in kWh of the 10 public markets for 41 months from July 2011 to November 2014 are shown in Figure 3. The minimum monthly energy consumption is 12,012 kWh while the maximum is 15,708 kWh. The average monthly energy consumption is 14,234 kWh with a standard deviation of 990 kWh. The highest consumptions were during the Christmas seasons.

This study provides a framework of methodology for public market design standardization in terms of embodied energy and energy consumption, the surveyed and calculated energy values from the samples show the relatively low and high values by identifying the mean ±2 standard deviation (σ).

The public markets were constructed mostly of concrete, steel, wood, wire, polyvinyl chloride, and tiles. The embodied energy intensity of materials and construction in PJ/m² is shown in Figure 4a. The maximum embodied energy intensity is 7.3 PJ/m² while the minimum embodied energy intensity is 3.4 PJ/m². The mean embodied energy intensity is 4.7 PJ/m² with a standard deviation of 1.4 PJ/m². Figure 4a shows that four public markets are within the range of mean to mean minus one standard deviation, one public market is within the range of mean minus one standard deviation to mean minus two standard deviations, three public markets are within the range of mean to mean plus one standard deviation, and two public markets are within the range of mean plus one standard deviation to mean plus two standard deviations. Public market E is the most embodied energy efficient.

The monthly operation energy intensity in MJ/m² is shown in Figure 4b. The maximum operation energy intensity is 31 MJ/m² while the minimum operation energy intensity is 13.1 MJ/m². The mean operation energy intensity is 19.2 MJ/m2 with a standard deviation of 6.2 MJ/m². Figure 4b shows that six public markets A, D, E, G, H, I are within the range of mean to mean minus one standard deviation, two public markets are within the range of mean to mean plus one standard deviation, and two public markets are within the range of mean plus one standard deviation to mean plus two standard deviations. Public market D is the most operation energy efficient.

The Pareto diagram of the processes is shown in Figure 5. Cooking (37.9 percent), ventilation and air conditioning (22.7 percent) and lighting (21.2 percent) constitute at least 80 percent of the energy consumption. The causes resulting to high energy consumption include rotten goods; inefficient lighting, cold storage, ventilation, and air conditioning; lack of energy conservation awareness; lack of discipline; unfamiliarity with renewable energy; lack of strict implementation of policy and regulations; and no proper partitioning of sections.

Table 1. Design criteria.

Energy Efficient
▪ Air Conditioners must be inverter-type and EER ≥ 13 ▪ Lights must be LED-type ▪ Daylight must provide at least 24 percent of everyday lighting ▪ All opaque roof panels must have fiberglass insulation, while translucent panels must be heat-blocking polycarbonate sheets ▪ Refrigerators, chillers, and freezers must be inverter-type and EEF ≥ 330 ▪ Electric motors with efficiencies ≥ 90 percent ▪ All air circulation must be provided by high-volume low-speed fans ▪ Solar PV array must have an efficiency ≥ 19 percent ▪ At least 85 percent of hot water must be from a solar water heating system ▪ At least 30 percent of heat power must be from a bio-digester system ▪ All non-load-bearing walls must contain blown-in fiberglass
Healthy
▪ Building materials do not contain hazardous chemicals ▪ Particulates, allergens, molds, and volatile compounds are not present in the air ▪ Relative humidity and evidence of moisture are low ▪ Nitrates and coliform bacteria are not present in the water ▪ Sound level must be less than 70 dB
Vibrant
▪ Variety of goods and services are offered, i.e., wet goods, dry goods, food items, non-food items, clothes, toys, and specialty items ▪ Variety of spaces to display goods are existing, i.e., wet and dry stalls, gift shops, cook-and-eat areas, etc. ▪ Variety of activities suited for all ages and interests are available, i.e. shopping, eating, playing, lounging, exhibiting, entertaining, etc.
Aesthetic
▪ Visual design elements as specified by the designer such as color, form, and texture are applied ▪ Design principles as upheld by the designer such as unity or harmony, balance, scale and proportion, and contrast are applied
Effective
▪ The building possesses visual impact, legibility of building type and function ▪ The building possesses statement of arrival, clarity, and ease of ingress and egress ▪ The building possesses accessible wayfinding, stress-free and barrier-free circulation ▪ There exist services for comfort and convenience, i.e. parking, toilets, waiting areas, Person With Disability/elderly/ special facilities ▪ There are back of the house services, i.e. administrative office, storage, mechanical services, delivery bays, solid waste management, etc.

The design considerations for new public markets include the use of low embodied energy materials, passive cleaning, passive ventilation and deodorizing, maximize natural lighting, building facing east and west for the shorter-side of the facility, installing efficient equipment, solar panel, bio-digester, rain harvester and wastewater treatment (Santos and Robbins, 2006). Table 1 tabulates the suggested design criteria.

The design criteria were formulated based on public consultation, personal perception and industry practice, and the current available technology. During the data gathering and public market survey, the end users composed of vendors and officials, were asked about their perception of an ideal public market. The criteria within the five major descriptors provided the concept on how to design an ideal public market facility.

The embodied energy of the existing market is computed by accounting all the materials and corresponding energy intensities. By changing the materials from high energy intensity to low energy intensity, a guaranteed decrease in overall embodied energy of the public market is expected. Table 2 shows the comparison of embodied energy of proposed public market design versus a sample of the audited public market.

Embodied energy can be decreased by reducing and/or changing the materials. As shown in Table 2, adjusting the ground footing of the public market wall and ceiling support can reduce the usage of concrete for structural foundations. Optimizing the layout of these foundations based on the design methods and preference of designers, architects and engineers will decrease the need of some materials such as tiles, steel I-beams and trusses, chicken wires, and wood panels. Changing the materials will also significantly reduce the embodied energy provided that these changes will still deliver the prescribed services and functions of the replaced materials. This can be observed by replacing the door material from steel to wood composites or by means of material reduction, the steel door can be fabricated to be thinner and lighter.

The proposed public market design is shown in Figure 6. The proposed energy intensity and operation energy consumption are shown in Figures 7a and 7b optimizing the design of the current public markets. The proposed building design has an embodied energy intensity of 4.2 PJ/m^2 which is lower by 10.6 percent from the mean of the public market samples.

Suggested technical specifications of the equipment used in the proposed design public market are based on the publicly available technology as of 2017. The operation energy intensity is 6.9 MJ/m^2 which is lower by 64 percent from the mean of the public market samples. The proposed energy savings measures are shown in Table 3. The design recommendation provides information on how to reduce the operation energy consumption of the existing and proposed public market design. It is based on the current energy practice from the observed samples of the study. Table 4 shows the different design policies grouped according to the nature of process, which in this case, the energy cost centers determined as shown in Figure 5.

Table 2. Embodied energy savings due to change of materials.

Building Materials		Material	Embodied Energy (MMJ/m²)	Existing Embodied Energy (MMJ)	Proposed Embodied Energy (MMJ)	Change in Embodied Energy (%)	Material Strategy	Specific Action
Parameter	Value (m²)							
Footings	4056	Concrete	473	1,920,040	409,003	79	Reduction	Re-layout of foundations
Ground Floor Flooring	4056	Concrete	473	1,920,040	409,003	79	Reduction	Use of natural rocks
Tiles	4056	Tiles	225	912,600	-	100	Replacement	Only cement flooring
Vinyl	0	Vinyl (PVC)	53	-	-	-		
Supporting Column (1st floor)	4056	Concrete	797	3,232,068	688,488	79	Reduction	Re-layout of foundations
Supporting Column (1st floor)	0	Steel I-Beam	426	-	-	-		
Supporting Column (1st floor)	0	Steel Trusses	174	-	-	-		
Supporting Column (1st floor)	0	Wood Joist	158	-	-	-		
Roofing Beam	4056	Concrete	797	3,232,068	-	100	Reduction	Re-layout of ceiling
Roofing Beam	0	Steel I-Beam	426	-	-	-		
Roofing Beam	0	Steel Trusses	174	-	149,968	-	Addition	Replacement for concrete support
Roofing Beam	0	Wood Trusses	237	-	-	-		
Roofing	4056	Steel Roofing System	947	3,840,081	818,005	79	Replacement	Optimization of roofing support
Ceiling	4056	Ceiling 1	199	807,955	-	100	Reduction	Use of natural lighting (open roof)
Interior Walls	0	Wood	237	-	-	-		
Interior Walls	0	Chicken Wire	316	-	43,173	-	Addition	Replacement for concrete blocks
Interior Walls	3106	Concrete block	1499	4,656,035	921,013	80	Replacement	Reduction of concrete blocks usage
Door	4056	Steel Panel	2367	9,600,202	2,045,013	79	Replacement	Replacement of wood panel
Door	0	Wood Panel	947	-	-	-		
Supporting Beam (2nd floor)	96	Concrete	544	52,261	470,353	800	Addition	Reduction of concrete by using steel for structural integrity
Second Floor Flooring	96	Concrete	947	90,889	818,005	800	Addition	
Supporting Column (2nd floor)	96	Concrete	600	57,563	518,070	800	Addition	
Supporting Beam (3rd floor)	0	Concrete	544	-	-	-		
Third Floor Flooring	0	Concrete	947	-	-	-		
Supporting Column (3rd floor)	0	Concrete	600	-	-	-		
TOTAL EMBODIED ENERGY (MMJ)				**30,321,803**	**7,290,094**	**76**		
ENERGY INTENSITY (MMJ/m²)				**7,303**	**4,219**	**42**		
AVERAGE ENERGY INTENSITY (MMJ/m²)				**4,743**	**4,219**	**10.6**		

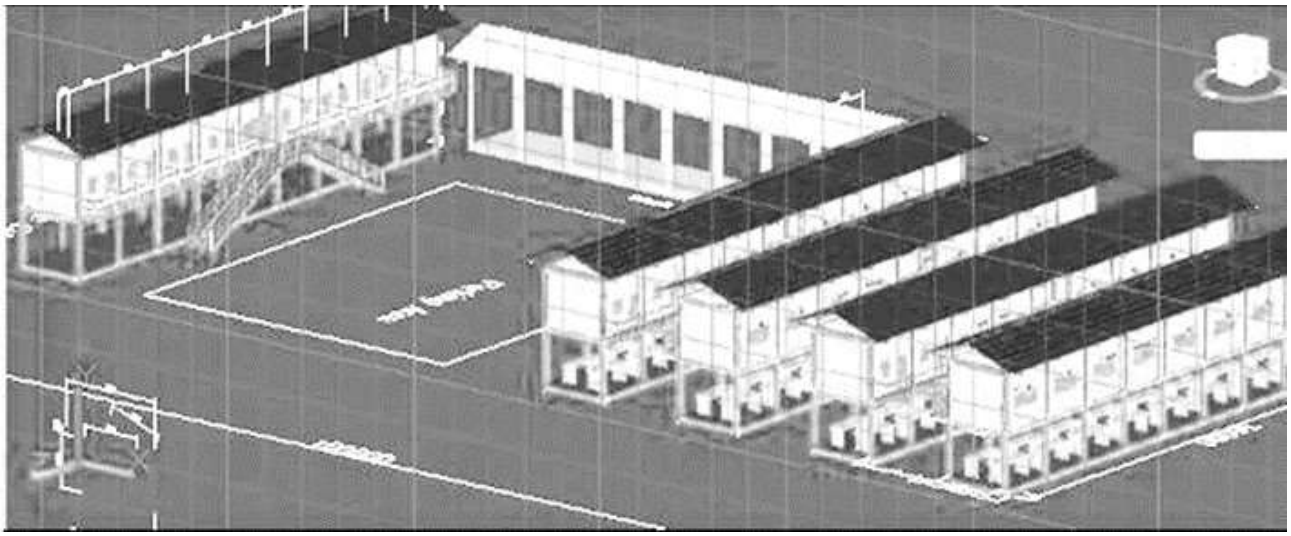

Figure 6. Proposed public market design.

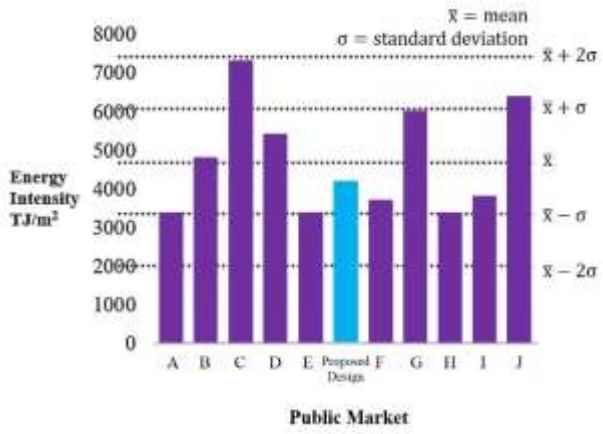

Figure 7a. Proposed public market design energy intensity of materials.

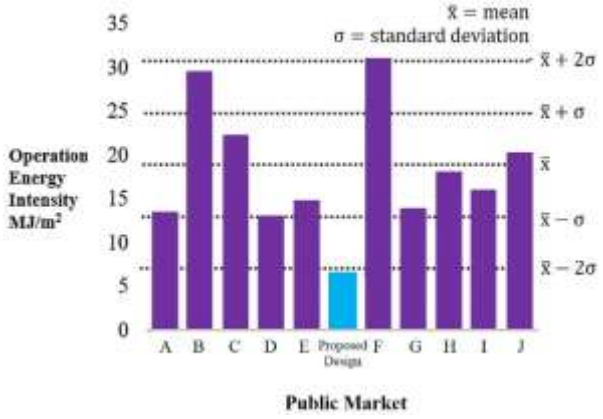

Figure 7b. Proposed public market design monthly operation energy intensity.

Table 3. Energy savings measures.

Energy Policy	Energy Savings	
	(MJ/month)	(PhP/month)
Bio-digester System for Cooking and Baking [1]	8195	9106
Solar PV System	5132	14256
Solar Water Heater [2]	4413	4903
LED lighting	3254	9039
Eco Ventilators [3]	2961	8226
Heat-blocking Translucent Roof Panels [4]	2662	7395
Fiberglass Roof Insulation	2468	6855
Structural Heat-insulated Panels [5]	1974	5484
High-EEF Refrigerator, Chillers, and Freezers [6]	1808	5024
Daylight Harvesting [7]	1775	4930
High-EER Air-conditioners [8]	1015	2820
Stand Fans Replacement (ceiling fans)	430	1194
High Efficiency Motors [9]	167	463

Sources: [1] Linear E.A.S.T., 2012; [2] U.S. Department of Energy, 2005; [3] Ampelite, 2013; [4] Translucent Heat-Blocking Panels, n.d.; [5] Structural Insulated Panel Association, n.d.; [6],[8] Department of Energy, n.d.; [7] DiLouie, 2007; [9] The Carbon Trust, 2015.

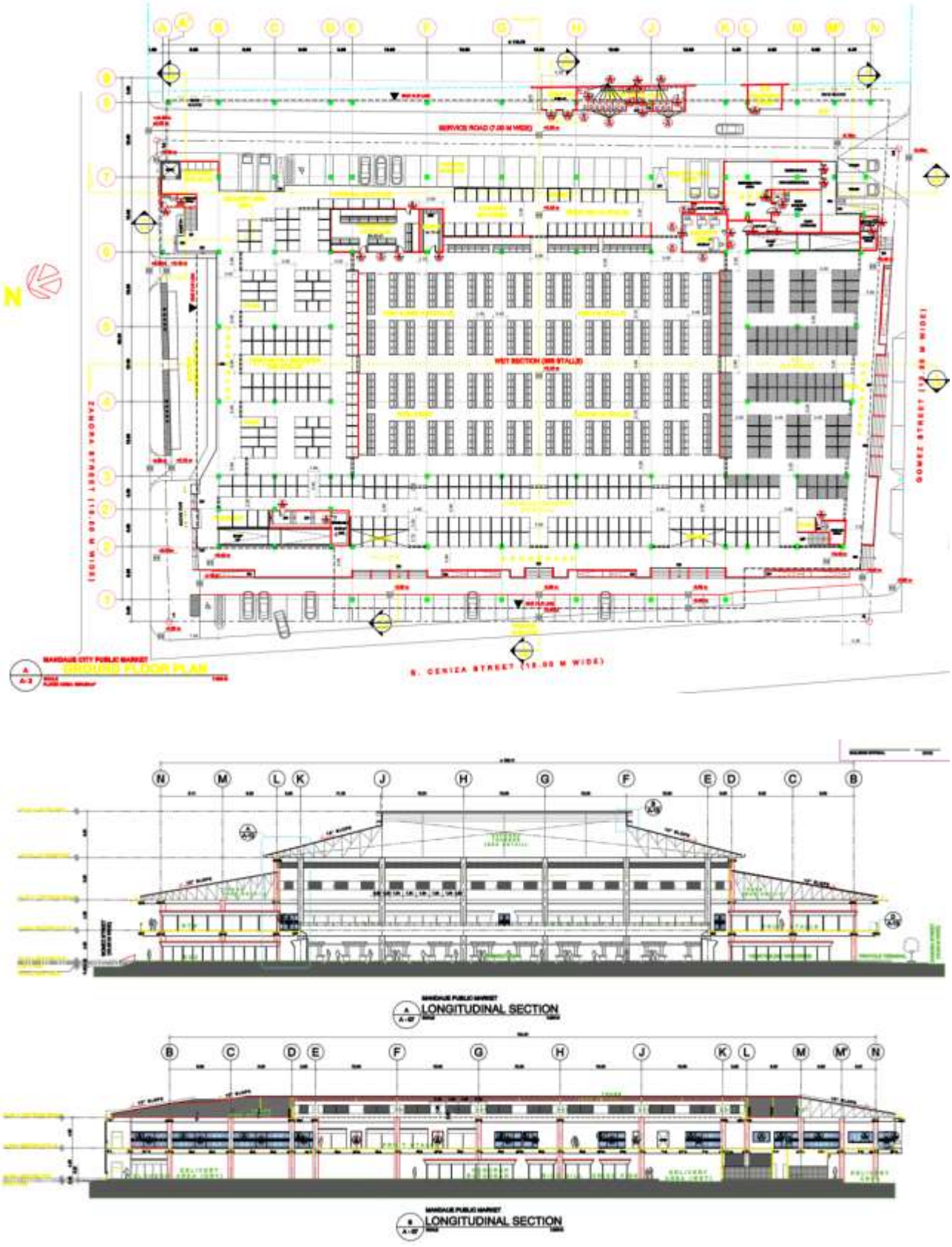

Figure 8. Actual public market design.

Figure 9a. Actual public market design energy intensity of materials.

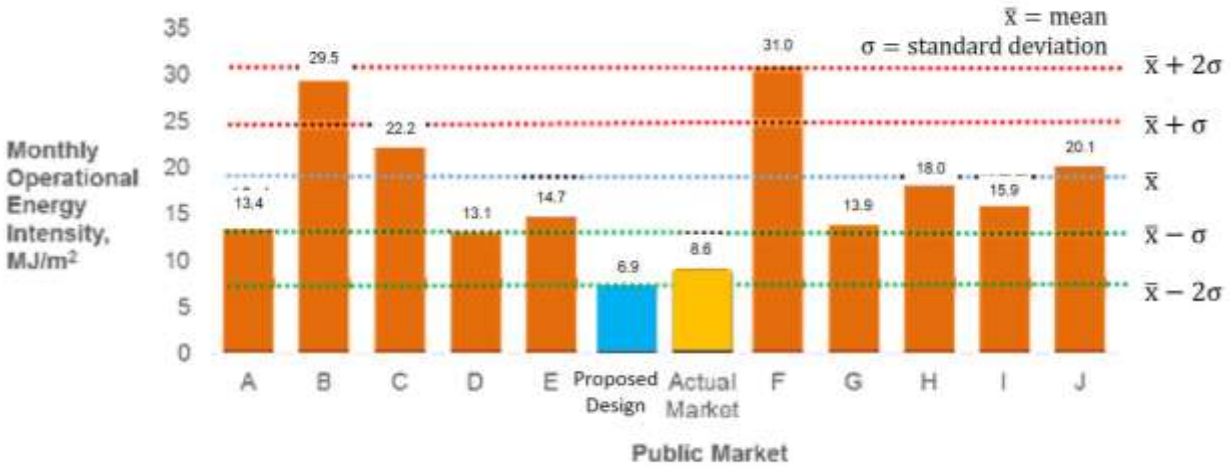

Figure 9b. Actual public market design monthly operation energy intensity.

Table 4. Energy policy savings.

Energy Cost Center	Existing Design Sample	Proposed Design	Energy Consumption Savings (%)
Lighting [1]	Incandescent Bulb and Fluorescent Light (100W and 40W)	LED Lights (15W)	85 or 62.5
Ventilation	Air conditioning EER (10)	Air conditioning EER (13)	30
Cooking [2]	Electric Stove (4.4 KW)	Induction Stove (2.8KW)	36.4
Data Processing [3]	Desktop PC (175W)	Laptop (60W)	65.7

Sources: [1] Based on 2018 Philippine LED market; [2] InductionPros.com, n.d.; [3] Stone, n.d.

An actual public market design adherent to the proposed framework incorporating the other parameters is shown in Figure 8. However, considering the better criteria in Table 1, the actual design has an embodied energy 10 percent more as expected, but 55 percent lower operation energy intensity than the average of the study samples. Figure 9a shows the actual public market design energy intensity of materials while Figure 9b shows the actual public market design monthly operation energy intensity.

IV. Conclusions and Recommendations

The average area of the dry section is 58.6 percent; the average area of the wet section is 21.5 percent and the average area of the semi-dry section is 19.9 percent. The average monthly energy consumption is 14,234 kWh. Among the processes, cooking registered the highest at an average of 37.9 percent, followed by ventilation and air conditioning at an average of 22.7 percent, and lighting at an average of 21.2 percent. The mean embodied energy intensity is 4.7 PJ/m^2 while the mean operation energy intensity is 19.2 MJ/m^2.

The design considerations for new public markets include the use of low embodied energy materials, passive cleaning, passive ventilation and deodorizing, maximized natural lighting, building facing east and west for the shorter-side of the facility, installing efficient equipment, solar panel, bio-digester, rain harvester and wastewater treatment.

The proposed building design has an embodied energy intensity of 4.2 PJ/m^2 which is lower by 10.6 percent from the mean of the public market samples. The operation energy intensity is 6.9 MJ/m^2 which is lower by 64 percent from the mean of the public market samples. However, considering the better criteria, an actual design has an embodied energy 10 percent more as expected, but 55 percent lower operation energy intensity than the average of the study samples.

It is recommended that a full-blown audit be conducted in all public markets to identify more specific interventions; a thorough profiling of market usages be conducted to be able to optimize usage, space allocation, access priorities, and anticipate future energy loads. It is also recommended that minimum standards for materials, processes, equipment and appliances be immediately adopted and implemented. It is further recommended that the other design criteria be quantified using preferential model.

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Distribution of Light Intensities of a Solar Bottle Bulb

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Abstract

Solar bottle bulbs (SBB) have been proposed as an inexpensive, eco-friendly alternative to electric lighting in dense residential settlements typically found in urban areas. Interestingly, little testing has been done to verify a solar bottle bulb's performance in terms of light quality. Sunlight with which the solar bulbs operate is dependent on local geographical and climatic conditions. This study aims to describe the amount of light output of a solar bottle bulb by plotting and investigating the distribution of light intensities transmitted indoors. This is done by measuring light levels at every one meter for every 15 degree angle from nadir, on two perpendicular planes to produce a polar graph. The polar graph indicates at which points light redistribution is at its highest intensity. Results from the data should provide insight into the effectiveness of the solar bottle bulb in terms of providing the minimum lighting requirements for a given space.

Keywords: Solar Bottle Bulb, distribution, alternative lighting technology, polar graph

I. Introduction

In the Philippines, a study of the population without access to electricity placed the number at about 16 million (Gonzales, 2013). This translates to 2.36 million households as of 2016 (IRENA, 2017). In urban slum areas, dwellings are built too close to one another such that natural lighting using windows is not possible all the time. On the other hand, dwellings in remote areas can be located far from the electricity supply grid. In both cases, the Solar Bottle Bulb (SBB) provides a creative solution to lighting these households. It is constructed from a plastic soda bottle almost full with a water and bleach solution. It is installed upright to fit into a hole in the roof. The SBB works by redistributing exterior light through internal reflection and refraction. SBB's act like skylights by reflecting and amplifying the rays of the sun into a room (Wang, et.al., 2014). In one study, it was observed that the SBB was brighter and shone more luminously compared to a regular bulb (Dixit & Dixit, 2013). Except for Issolio and Buriek (2015), these previous studies were focused on measuring light levels alone, and not the manner which the light is dispersed in a given space. In this paper, the researchers took measurements to compare exterior and interior lighting levels with an SBB installed, and they also commented on the lighting quality in terms of brightness, contrast and uniformity in providing an optimal environment for seeing.

There is still a lack of technical information describing the SBB's performance. Related studies used boxes of cardboard (Maillet, 2012), and of unspecified material (Issolio & Buriek, 2015) as their testing site. The test used an actual structure, but no dimensions were mentioned. A single SBB is said to be able to provide as much as 55 watts (70 lumens) of light (Dixit & Dixit, 2013), however there are no data that describe the shape or form with which the light is spread or distributed into the room. In addition, examining the SBB from the perspective of lighting industry standards will put its use into a more relevant context. In actual practice, the type of light selected is based on its light distribution as well as its luminance.

Knowing the shape of light distribution will suggest how best to utilize the SBB in terms of spacing on the roof, or shape of the bottle used, and how it affects visual comfort. This study thus aims to provide initial information on an SBB's light distribution or spread through the use of polar graphs. The test was performed in a garage with an

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uninsulated, corrugated roof. Because the test was done in an actual site, data measured were expected to be dependent on the sun and sky conditions at the time of the test due to its geographical location and orientation. Through exposure and experience, it provided the researchers with first-hand information in the interior lighting conditions in human scale as effected by the SBB.

II. Methodology

The researchers measured illuminance levels at every one-meter incremental distance from the light source (SBB) at every 15-degree increments from nadir; and to produce a polar graph of the light distribution of the SBB. A polar graph is a type of photometric data used in the lighting industry to present in graphical form the angular spread of light intensity produced by wide spread lights (Photometry & Optimal Testing, 2016). Distribution refers to a discernible pattern of light spreading outwards from a light source. Empirically this can be observed as a pattern on the floor or any horizontal surface which receives the distributed light.

The research only measured light levels at a certain hour in the afternoon. The time of measurement varied depending on when the sky is clear, because it was found that measuring during overcast conditions yielded extremely low illuminance levels indoors. The test site was chosen to be a 53-square meter garage in Meycauayan, Bulacan for practical reasons. It also had the added advantage of being clear of any vertical surrounding obstructions thus giving a wider angle of exposure to the sun path. A manual method of obtaining illuminance values was devised by plotting points along vertically oriented X and Y planes with their center points coinciding with the SBB installed at the roof. Each plane consists of angular increments of 15 degrees from nadir along which distances of one, two, and three meters from the SBB were plotted. Strings and masking tape were used to identify the measuring points in the planes. Illuminance values are measured using a lux meter.

A. Materials

For Solar Bottle Bulb

The SBB is constructed of very common household materials. For instance, any plastic bottle that is one liter or bigger may be used, as long as it still has its cap. Bleach is a commercially available liquid domestically used for cleaning and removing stains. The sealant, and if necessary, the roof sheet, may be purchased in any neighborhood hardware store. It is important to get the same profile roof sheet as the one existing so that they match, as this facilitates easier installation and caulking (see Figure 1).

In order to simulate a completely dark room ideal for measuring, miscellaneous items such as rags, newspapers, cardboards, mats and blankets were used to cover up gaps and other openings.

For Measurement

The materials used are simple and accessible as shown in Figure 2. The only equipment are the light meters. For the measurement, the following were used:

- Protractor – This was used to manually measure angular distance from the SBB.
- Carpenter's chalk – Chalk was used to mark off on the ground the X and Y axes, as well as the mounting points for the nylon string indicating both angular and linear distances from the SBB.
- Nylon string – To help locate the radial distances from the SBB, string was mounted from a common point immediately below the SBB, and mounted at their respective end points of the angular distances required. Radial distances were then measured from the SBB along the string, at one-meter, two-meter and three-meter distances at which they were taped.
- Duct tape – Any tape will do. But preference for duct tape is due to its wide range of applicability. In this case, it was used to tape off linear distance markers on the nylon strings and seal off any small gaps in the structure.
- Lux meters – Two sets of light meters were used for the study to ensure precision. One lux meter used was the Sekonic® Flashmaster L-358, a digital meter capable of measuring for ambient and flash light; it was set on shutter speed priority mode in accordance with prescribed setting for measuring ambient light. The second unit is a Dr. Meter® LX1010B, with a measuring range of 0-100,000 lux. No setting changes were necessary for this meter.
- Level bar – This was used to ensure that the illuminance recordings were from a horizontal plane, such that the lux meters were placed on top of the level bar.
- Paper and Pens – For documentation and encoding.

B. Field Set-up

Constructing the Solar Bottle Bulb

Remove all wrapping from the bottle's surface. Sand lightly at about a third way down the bottle to ensure adhesion of sealant. Slot the bottle upright through to a custom cut hole in a 300mm x 300mm roof sheet, leaving only a third of its body above the sheet. Apply sealant to the joints above and below the roof sheet. When dry, fill the bottle with filtered water mixed with two capfuls or about 10 milliliters of bleach. Screw cap back in place. In a cut hole in the garage roof, place the sheet with the bottle over the hole, and rivet firmly in place. Apply sealant at edges and at rivets.

Establishing Measurement Planes

On the floor using a square edge, a line directly below the SBB perpendicular to the garage entrance was drawn using a carpenter's chalk to indicate the X-plane (C180 – C0). A perpendicular line was also drawn to be the Y-plane (C90 – C270). All openings and cracks in the structure were sealed to prevent outdoor light from

contaminating the data. The SBB was installed on the roof of a garage shown in Figures 3 and 4. A single SBB with dimensions shown in Figure 5 was installed to determine the spread or the distribution the light intensities.

The nylon string was labelled at the one-, two- and three-meter radial distances from the SBB. A hoop was installed on the underside of the bottle to which the labelled string was hitched. This string was then used locate 15-degree angle increments from nadir. Using a level bar and a protractor, the string was aligned at nadir (0°, with string perpendicular to the floor), 15°, 30°, 45°, 60°, 75°, and -15°, -30°, -45°, -60°, -75°. Figures 6 and 7 show the cross and longitudinal sections setup where radial lines represent the nylon strings along which are the points at which to measure light with a lux meter. With the markers indicated on both the string and the floor, the location of the required points for measurement was done by simply aligning the string to the plane, affixing it to the angular marker on the floor, and positioning the lux meter on the distance marker along the string. Figure 8 shows the measurements presented on the floor plan. The negative/positive values for radial distances are drawn on the left and right of the SBB which occupies the center of the plan.

When discussing illuminance with respect to intensity, the Inverse Square Law for light states that the illuminance varies directly with the intensity, and inversely with the square of the distance from the light source to the surface,

$$I = Ed^2 \qquad (1)$$

where E is the illuminance in lux, I is the intensity in candela and d is the distance from point source in square meters.

Figure 1 (clockwise from top left). 1.5L plastic bottle to be filled with filtered water; Epoxy /rubber sealant; Bleach; and Galvanized Iron sheet to match existing roofing.

Figure 2 (clockwise from top left). Protractor; Carpenter's chalk; Nylon string; Duct tape; Lux meters; and Level bar.

Figure 3. Typical installation viewed from interior (left photo) and exterior (right photo).

Figure 4. Photo of testing site (Garage).

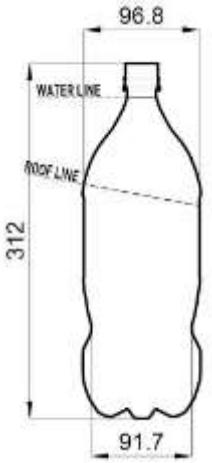

Figure 5. Typical dimensions of 1.5L plastic bottle (in mm).

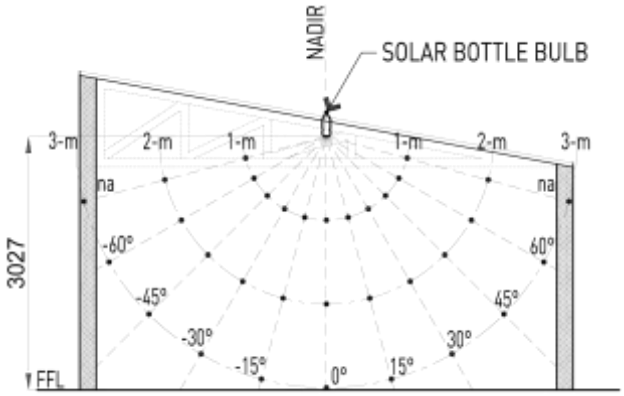

Figure 6. Field set-up along Y-plane (C270-C90).

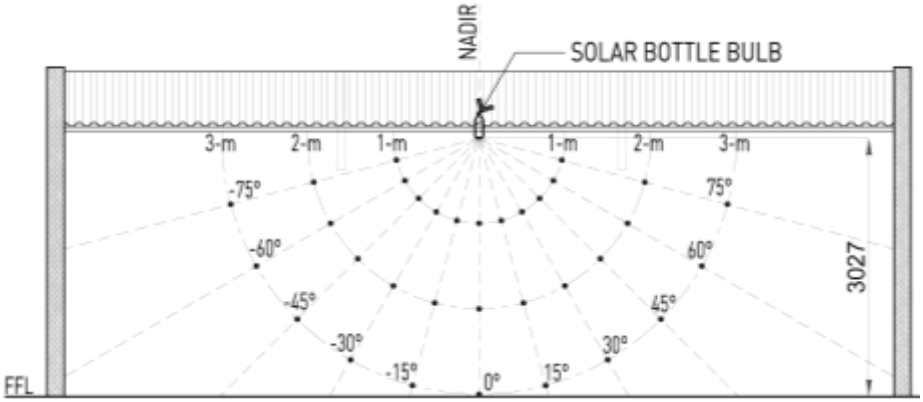

Figure 7. Field set-up along X-plane (C180-C0).

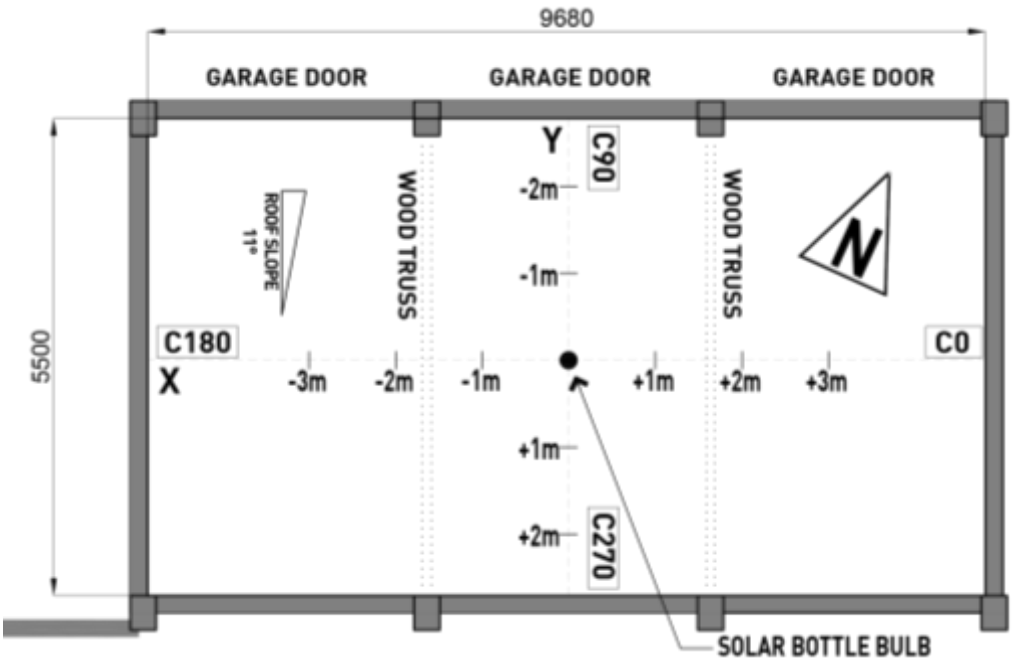

Figure 8. Garage layout and orientation with both X and Y-planes parallel to walls.

C. Data Collection

Measurements were taken for three separate afternoons on April 26, May 13, and May 16, 2015. The outdoor illuminance level was recorded, followed by the illuminance measurement right beneath the SBB. The percentage ratio of these two values is the daylight factor (DF). DF hints at the SBB's efficiency in allowing daylight into the room. This value is taken because the SBB is considered a daylighting technique, as it relies solely on exterior daylight to supply indoor lighting. Light levels were taken at one-, two- and three-meter distances from the light source, at every 15° angle increments from nadir for both planes. For consistency, the lux meter was always oriented facing directly upwards, not facing the SBB, when taking measurements to simulate actual conditions on a typical horizontal working plane. The illuminance values were then converted into candelas to isolate the luminous intensity value by disregarding the area of the surface onto which the light strikes. The luminous intensity was taken using Equation 1.

As an example, in the Y-Plane of Test Day 1, an illuminance of seven lux is recorded at two meters along nadir. Using Equation 1, the intensity is computed to be 28 candelas. These candela values were plotted in a corresponding graph where the concentric arches show increasing intensity the farther they are from the light source, and the radial lines indicating the angular increments. For every angle, the highest intensity was taken and plotted on the graph. The plotted points were linked to one another with a line that starts and ends at zero of both planes. Each plane is illustrated in one graph.

The resulting polar graph should indicate at which areas around the SBB the luminous intensity is at its highest, and therefore brightest to the human eye. It tells the viewer where to expect the most light to be spread. The shape should also indicate the type of distribution of light, whether it is concentrated mostly at one point, or more spread around and below the SBB. AutoCAD® was used to generate the polar graphs.

The location of the site with respect to the solar movement was necessary to provide context to the research. Because this is an actual test, actual sky conditions played a huge part in defining the results. Using an online sun path calculator (SunCalc, 2015), diagrams of the sun's location particular to the three test dates and times were generated as shown in Figures 9, 10 and 11. A floor plan of the garage was overlaid on the sun path images using a photo editing software (Adobe Systems Incorporated, 2007) to provide the site's solar context. The straight orange line indicates sun position at the specified time.

III. Results

The tables in the succeeding pages record the lux reading obtained on the test days. "NA" is supplied in points where the lux meter registered an error in reading, possibly due to light being blocked by roofing members, or reading may not have been possible as the reading location is beyond the given space on site. Prior to installation of SBB, the test site was measured and yielded zero (0). Despite the minimal unwanted light penetrating through the gaps, a reading of zero (0) could be due to the horizontal orientation of the meter.

Figure 9. Sun path at test site at 3:45 p.m. on April 26, 2015.

Figure 10. Sun path at test site at 2:30 p.m. on May 13, 2015.

Figure 11. Sun path at test site at 2:30 p.m. on May 16, 2015.

Table 1. Lux levels recorded on Day 1 (April 26, 2015, 3:45p.m.)

ANGLE	APRIL 26, 2015; 3:45p.m. External Light Level : 5,800 lux Internal Light Level (near SBB) : 70 lux Daylight Factor: 1.2%											
	X-PLANE						Y-PLANE					
	1-m		2-m		3-m		1-m		2-m		3-m	
	Lux	Candela	Lux	Candela	Lux	Candela	Lux	Candela	Lux	Candela	Lux	Candela
-75	1	1	na	na	na	na	0	0	0	0	0	0
-60	5	5	na	na	na	na	3	3	0	0	0	0
-45	10	10	1	4	na	na	13	13	1	4	0	0
-30	16	16	3	12	na	na	11	11	2	8	0	0
-15	33	33	7	28	na	na	12	12	2	8	1	9
0	31	31	8	32	2	18	35	35	7	28	2	18
15	29	29	6	24	2	18	25	25	6	24	2	18
30	25	25	3	12	1	9	18	18	4	16	1	9
45	11	11	1	4	na	na	15	15	3	12	0	0
60	na	na	na	na	na	na	5	5	na	na	na	na
75	na	na	na	na	na	na	na	na	na	na	na	na

Table 2. Lux levels recorded on Day 2 (May 13, 2015, 2:30p.m.)

ANGLE	MAY 13; 2015, 2:30p.m. External Light Level: 8,180 lux Internal Light Level (near SBB): 62.4 lux Daylight Factor: 0.7%											
	X-PLANE						Y-PLANE					
	1-m		2-m		3-m		1-m		2-m		3-m	
	Lux	Candela	Lux	Candela	Lux	Candela	Lux	Candela	Lux	Candela	Lux	Candela
-75	0	0	0	0	na	na	11	11	0	0	na	na
-60	15	15	1	4	0	0	11	11	1	4	0	0
-45	64	64	21	84	8	72	38	38	6	24	3	27
-30	33	33	9	36	3	27	35	35	8	32	2	18
-15	25	25	7	28	2	18	74	74	18	72	7	63
0	30	30	7	28	3	27	30	30	7	28	3	27
15	47	47	12	48	4	36	29	29	8	32	3	27
30	37	37	7	28	3	27	39	39	13	52	5	45
45	27	27	5	20	2	18	52	52	12	48	5	45
60	8	8	1	4	0	0	14	14	1	4	0	0
75	na	na	na	na	na	na	na	na	na	na	na	na

Table 3. Lux levels recorded on Day 3 (May 16, 2015, 2:30p.m.)

ANGLE	MAY 16, 2015; 2:30p.m. External Light Level: 3,600 lux Internal Light Level (near SBB): 30 lux Daylight Factor: 0.8%											
	X-PLANE						Y-PLANE					
	1-m		2-m		3-m		1-m		2-m		3-m	
	Lux	Candela	Lux	Candela	Lux	Candela	Lux	Candela	Lux	Candela	Lux	Candela
-75	0	0	0	0	na	na	0	0	1	4	0	0
-60	1	1	0	0	0	0	11	11	1	4	0	0
-45	15	15	3	12	0	0	14	14	2	8	0	0
-30	33	33	3	12	0	0	14	14	2	8	0	0
-15	43	43	7	28	2	18	15	15	3	12	0	0
0	18	18	4	16	1	9	18	18	4	16	1	9
15	11	11	2	8	0	0	45	45	11	44	4	36
30	13	13	2	8	0	0	24	24	7	28	2	18
45	10	10	2	8	0	0	28	28	5	20	1	9
60	2	2	0	0	0	0	6	6	1	4	0	0
75	na	na	na	na	na	na	2	2	0	0	0	0

IV. Analysis and Discussion

The data from the three test days showed a combination of outward and concentrated distribution where there are several high intensity spots corresponding to the SBB's profile at the base. In all but first case, the spread of light on the floor was clearly uneven, with two to three distinguishable areas of concentrated light. The light spread produced requires the observer to be at a location away from nadir to be able to see and perform tasks. The spotted patterns also indicate at the unevenness of light distribution not optimal for effective use and visual comfort.

Looking at the Day 1 polar graphs where the bottle cap was removed, the outline is considerably rounder and smoother than the succeeding test days. Light is most noticeably concentrated at the nadir and decreases abruptly towards the sides. But on the x-plane, the shape is rounder. It is possible that the bottle cap may have an effect in the light spread. The brightest area is approximately below the SBB with an intensity of 30 candelas (see Figure 12).

For Days 2 and 3, though the outlines differ as seen in Figure 12 and Figure 13, it is to be noted that the general trend is a split or a divide between two areas of high illuminance as can be seen in Figure 15. This would suggest either two causes: (1) the bottle cap, or (2) the steep concave curve of the bottle. The brightest areas register at 74 to 84 candelas, on one side of the nadir on both planes.

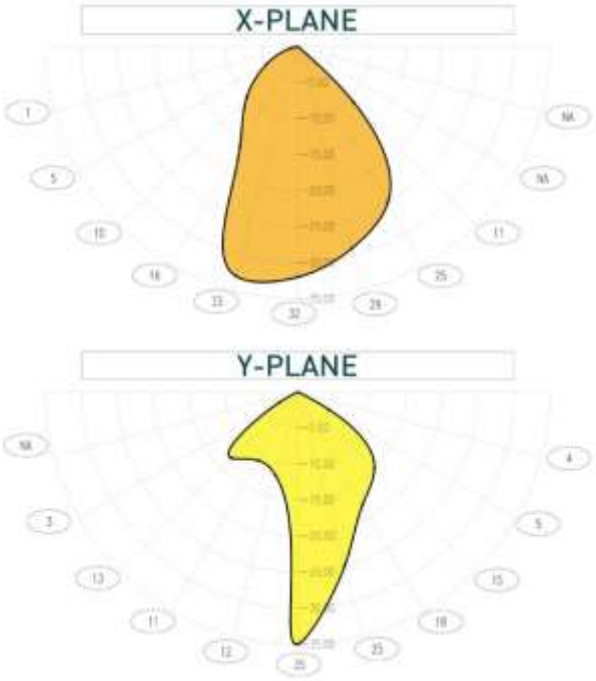

Figure 12. Polar graphs of C180-C0 plane (top) and C270-C90 plane (bottom) on Day 1.

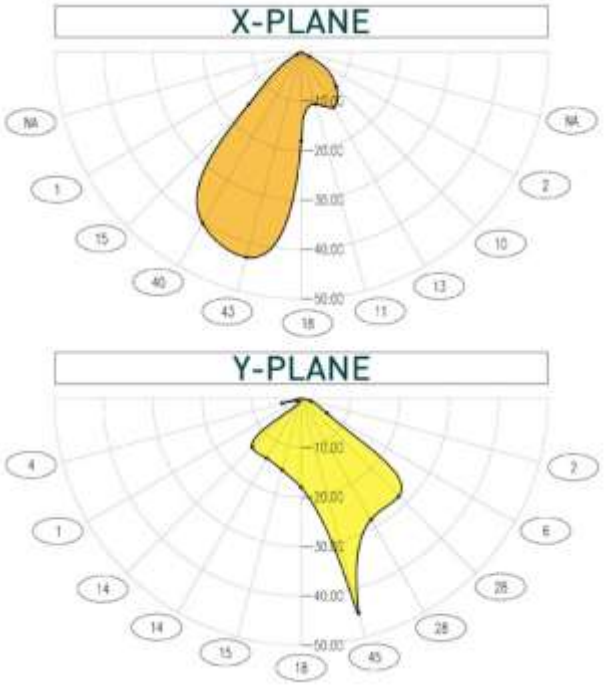

Figure 14. Polar graphs of C180-C0 plane (top) and C270-C90 plane (bottom) on Day 3.

In Figures 13 and 14, though the graphs for the last two test days do not look entirely the same, they have one key similarity – and that is presence of a dark area in the middle. The highest intensity registers at 45 candelas located at -15 degrees from nadir on the Y-plane. At the nadir, the light intensity available is very low.

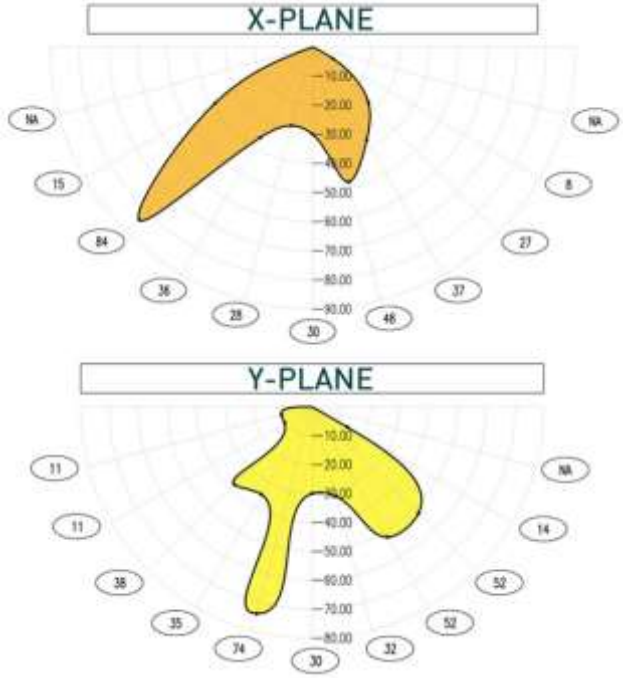

Figure 13. Polar graphs of C180-C0 plane (top) and C270-C90 plane (bottom) on Day 2.

In Figure 16, it is interesting to note that incidentally, reckoned in plan, the direction of sunlight is parallel to the line between the two lit areas in the room. It appears that the SBB performs mostly through directional light, and not diffused, omnidirectional daylight. Had the latter been true, the refracted light should have spread evenly and almost symmetrically on the floor. Figures 17, 18 and 19 show the location of the sun at the time of testing, as well as the combined polar graphs of the light intensities recorded at both X- and Y- planes. There is no apparent predictability in terms of the resulting graph with respect to the sun's location.

With a DF of 1.2 percent as the highest value, the study found that the SBB is not able to utilize the exterior light even for easy tasks, nor does it amplify the sun's rays as was suggested by Maillet (2012). The acceptable DF for easy tasks is at 1.5 percent to 2.5 percent (Grodznik and Kwok, 2015). However, it must be remembered that Maillet did not mention the distance from which the measurements were taken, i.e. they could have been taken very near to the SBB. In fact in our study SBB permits only a miniscule amount of light that one SBB typically would not suffice for a small household, and certainly not for a residential unit with approximate size to the test site. Some small increase in light transmission may be noticed if the roof were lower. DF is also more used in describing an array of lighting fixtures thus there is the option to install multiple units of the SBB as proposed by Maillet (2012), provided the most efficient layout and spacing has already been studied. In this study, the researchers measured specifically the distribution of light intensities for an individual SBB.

Figure 15. Light spread on the floor with two distinct areas of relatively high illuminance.

Figure 16. Light spread on the floor with floor distinct shadows in the middle, or in between the lit areas.

In addition, studies of multiple-bottle configurations and their ideal spacing must consider its impact on the roof structure, if any. The results also differ from those obtained by Issolio and Buriek (2015) due to several factors such as different test conditions. Whereas the Issolio study was done through simulation in a 45-centimeter box painted matte white on the inside, this study was performed in an actual structure.

The lower illuminance and candela values measured in this study can be explained by the larger test area and higher installation height. The erratic pattern on some graphs may have been the result of intermittent cloud cover during testing. The precision of the values in the Issolio study can be attributed to their use of a goniophotometer as a measuring instrument to record the performance of the SBB with respect to different locations of the sun or light source.

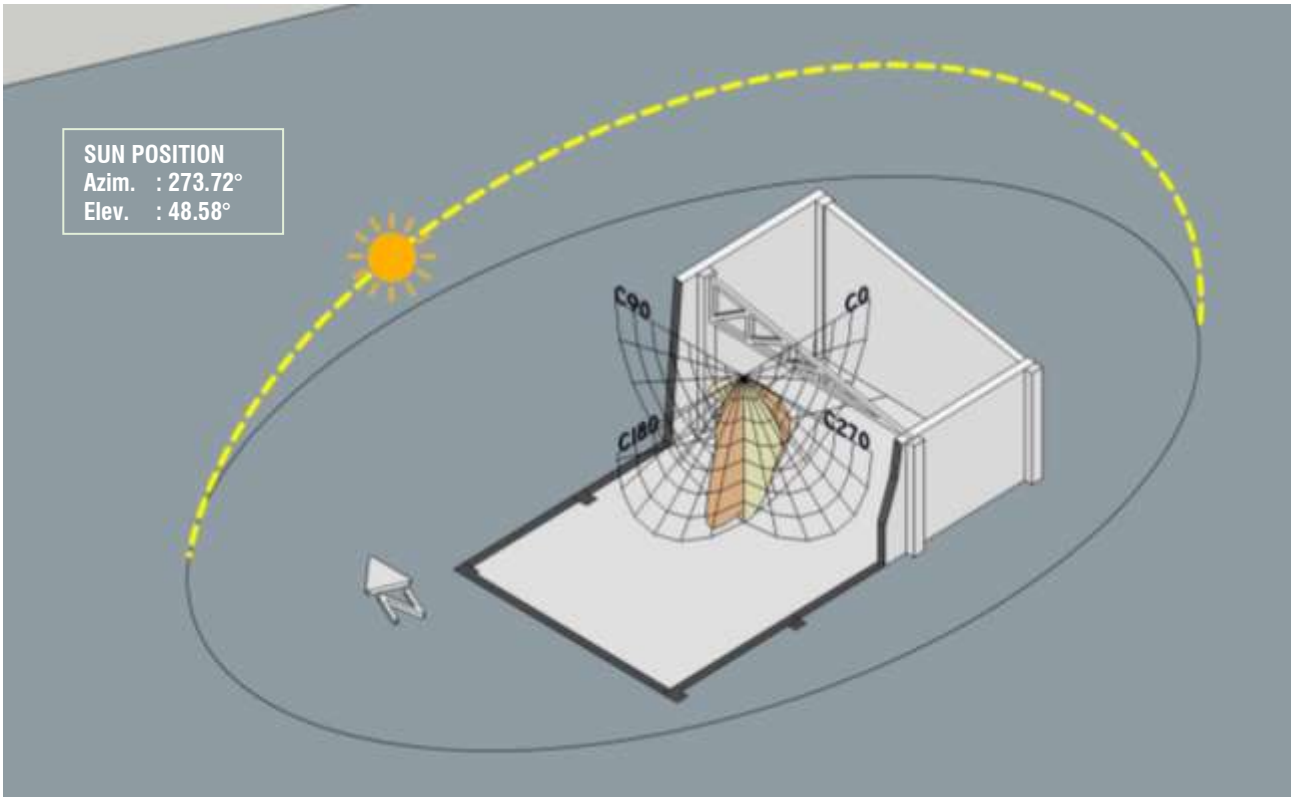

Figure 17. Combined X and Y graphs and sun path on Day 1 (April 26, 2015, 3:45 p.m.).

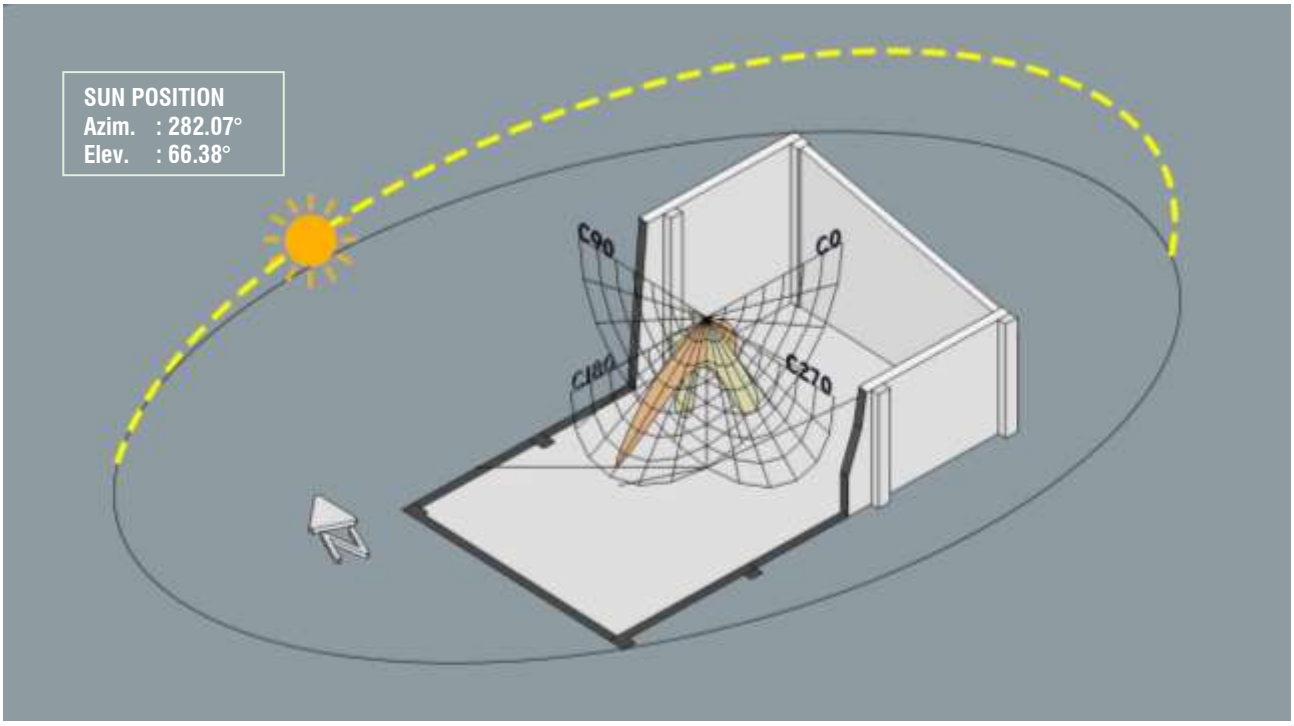

Figure 18. Combined X and Y graphs and sun path on Day 2 (May 13, 2015, 2:30 p.m.).

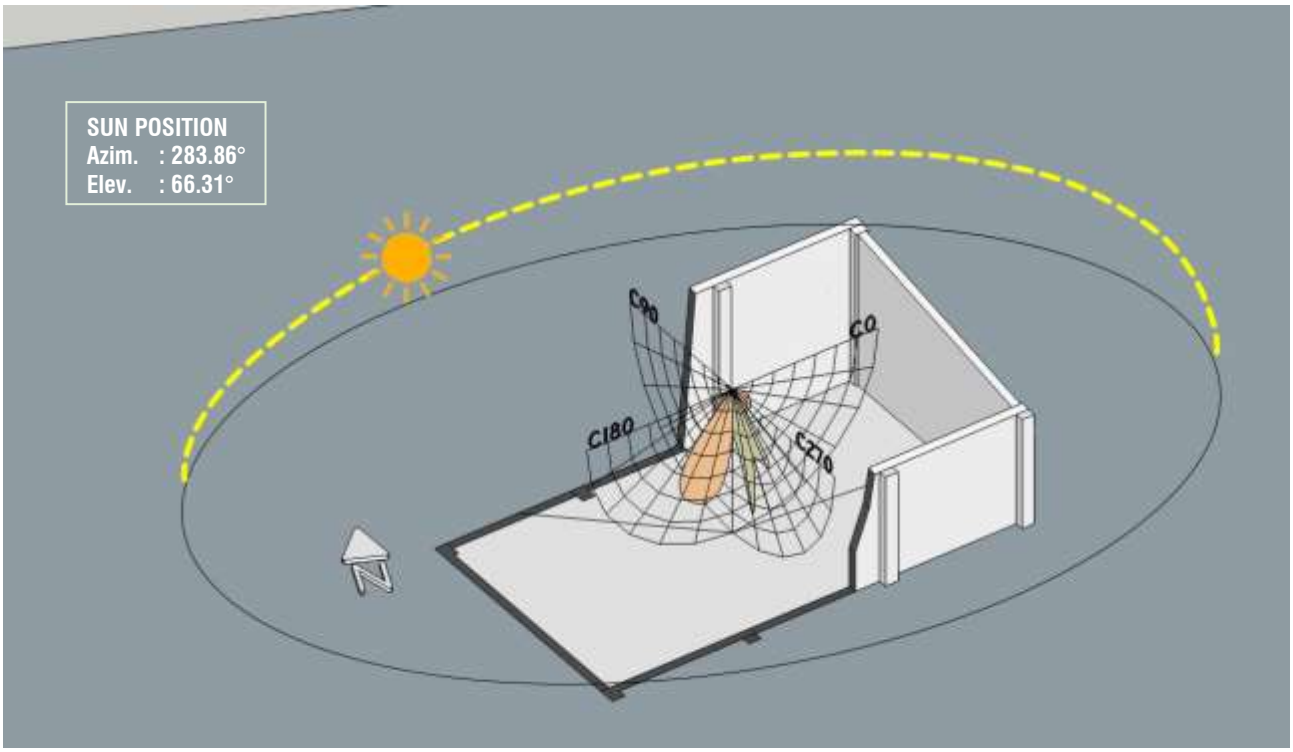

Figure 19. Combined X and Y graphs and sun path on Day 3 (May 16, 2015, 2:30 p.m.).

In this study, the highest illuminance recorded for all three days was 74 lux, a value lower than minimum requirements for comfortable visual environment. As a visual reference, an illuminance of 107 lux is typical of a very dark day; while twilight registers as 10.8 lux as charted by the NOAO (National Optical Astronomy Observatory, n.d.). Where distribution is concerned, the desired omnidirectional pattern for general lighting is not achieved. This does not appear to be a function of the materials used, but rather of the shape of the bottle. Based on the resulting light patterns visible on the floor, it shows that no light is transmitted below the central recess of the SBB's base. This can be attributed to internal reflection, where the inwards curve of the recess reflects light back towards the upper portion of the bottle instead of downwards. The low daylight factors may have resulted from measuring directly below the recess of the bottle, which was done for consistency at the time. The bottle cap affects light distribution the higher the sun's position in the sky, as suggested by stark contrast in intensity levels below nadir between test Day 1 which was done at 3:45 p.m. compared to test Days 2 and 3 which were done at 2:30 p.m.

By using an actual space as the test site, the researchers were able to differentiate this study from others which used boxes. The use of the garage provided human scale to the test and first-hand observation of an SBB's effect to the visual environment indoors. Furthermore, because the study relied on natural lighting as experienced in the Philippines, it provided usable and applicable data when these SBB's are to be applied in the country.

V. Conclusion

The highest intensity was 84 candelas at two-meter and angular distance of 45 degrees. Eighty-four candelas are approximately 40 lumens – a small value compared to 750 lumens (incandescent bulb); 3,000 lumens (Fluorescent Lamp); and 1,000 lumens (Halogen Lamp) which all consume 50 watts of power to produce light.

On Days 2 and 3 when the bottle cap was in place, the graphs show a trend of a defined dim area at the nadir. It appears that the recessed portion of the bottle's base prevents light from being refracted downwards. However, the five protruding domes of the base do not always present with illuminated areas, with the study showing at most two bright areas instead of five. The study has not attempted to understand why this is so, but it is possible that the SBB may favor directional incoming light.

The low illuminance values recorded can be ascribed to the horizontal orientation of the lux meter as an attempt to simulate the work plane. An alternative way of recording would be to orient the lux meter perpendicular to the light's angular distance. Furthermore, preciseness of values may be improved with the use of a goniophotometer, and a higher sensitivity lux meter.

While the SBB is an easily accessible alternative to electric lighting, the quality of light it provides is unpredictable as it is generally dependent on the sun. As the sun moves across the sky throughout the course of the day, so does the refracted light as it enters the room. Because the SBB works by refracting and internally reflecting the incoming sunlight to the interiors, it is apparent that the shape of the

bottle itself affects the distribution or spread of light. At the very least, the research shows that the bottle shape spreads light unevenly, thus making it an unreliable bottle shape for this purpose. Tests using differently shaped bottles would provide further insight into this notion. Since SBB's are supposedly to be used by a considerable portion of the urban population, it should possess such characteristics as to be able to provide sufficient and comfortable lighting. By establishing the ideal SBB shape based on its light distribution shape and quantity of light refracted, the design and use of this alternative technology can be made more efficient and capable of competing with conventional lighting. Materials other than bottles may provide better light distribution capabilities. The primary challenge posed in the manual method lay in the execution. As it was necessary to take measurements continuously at both planes per test day in an attempt to keep up with actual sky conditions, it required the researcher to be contained within the sealed garage for the duration of the test. A way to improve this study is to use a goniophotometer which is able to more accurately measure light at the most precise locations or points specified.

A more immediate continuation of this study is to obtain measurements for a number of days covering the different times of the year. However, this study established a workable and comprehensive means of measurement of light intensities and illustrated them clearly. Once a method had been developed, it would be easier to make measurements for the other days of the year. Relatedly, at present, the Massachusetts Institute of Technology is modelling a night light version which uses a small solar panel to power four LED lights for use at night time.

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SPECIAL FEATURES

These are non-peer reviewed articles written by the MUHON Editorial Staff to feature designs, creative works, and efforts and initiatives related to research and development of the designed and built environment.

The New Studio Laboratory Building of UP Diliman College of Architecture

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Figure 1. Former UPCA Dean Mary Ann Espina, Architect-on-Record of the UPCA Studio Laboratory Building.

Just a few blocks south from the famous landmark Oblation sculpture in Quezon Hall of the University of the Philippines (UP) in Diliman, one can find the UP College of Architecture (UPCA) Complex. Boldly identified with the four letters of A-R-K-I along its drop-off, and the yellow-painted façade with the "100% ARKI" banner, the complex spreads over three hectares, between the streets of E. Delos Santos and I. Delos Reyes. The UPCA Complex has three buildings and an outdoor amphitheater. Currently, Benito Sy Pow, a 413-seating capacity auditorium is nearly finished within the complex. Building 1, designed by former UPCA dean Ar. Jose Danilo Silvestre, was intended as a gallery for annual exhibits and college-based social activities. For now, laboratory works by design classes are being held there. It is also where the "tambayans" or college organization spaces are temporarily located. Building 2, which was once the Campus Maintenance Office (CMO), was designed through the principles of adaptive reuse by Ar. Nicolo Del Castillo, also a faculty member of the College. It is where most of the lecture-based classes are held. The UPCA Library, which has a collection of around a thousand books, magazines, theses, and other references, can also be found in this building.

The latest addition to the complex is the newly constructed Building 3 or the UPCA Studio Laboratory Building. Considered to be the tallest structure within UP Diliman campus to date, this building has seven floors divided into 36 senior and 39 junior faculty rooms, 24 critique rooms, 24 undergraduate and two graduate studio laboratory rooms, a printing room, a model-making room, and a roof deck. Its main entrance faces west along I. Delos Reyes Street, where students and faculty can view sunsets in the afternoon. Soon to be called home to UPCA's growing number of more than 50 faculty members, 800 students, and 20 staff and utility members, Building 3 will make its mark in history by providing a building to inspire architects and landscape architects of the future.

The MUHON Editorial staff sat down with Architect-on-Record Mary Ann Espina for an interview. She described in detail how Building 3 was conceptualized, major challenges in construction, and how the new building fits in the vision she foresees for the college. The article that follows is based mostly from that conversation.

Expansion of the UPCA Complex

Newly sworn in 2010, former Dean Ar. Mary Ann Espina started her term through a college-wide house-cleaning project. On her immediate to-do list as dean was to ensure that the existing two buildings of the College of Architecture were rain-proofed and can easily be accessed to and from each other. Being a tropical country with pronounced dry and wet seasons, the UPCA complex should be adaptable to extreme weather conditions and climate–sensitive to Diliman's microclimate. Beyond just fixing leaking roofs and canopies, she was compelled to respond to the increasing need due to increasing population of the college and the changing academic landscape of the UPCA complex.

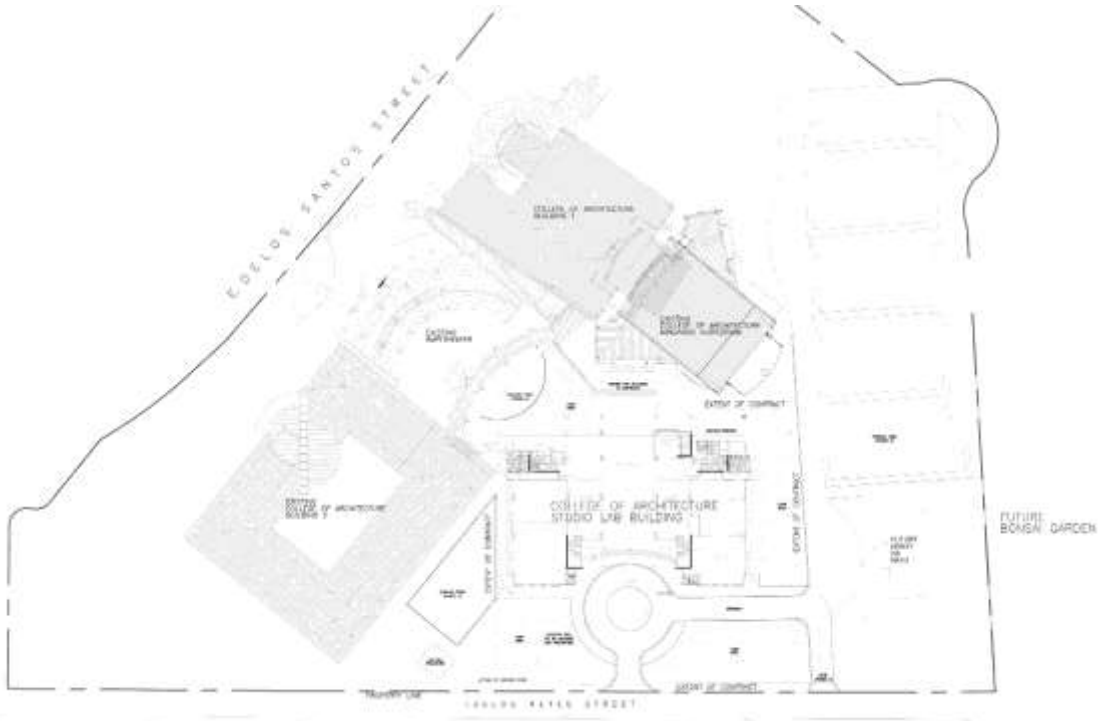

Figure 2. Master Development Plan of the UP College of Architecture Complex.
Source: UP Office of Design and Planning Initiatives

Mapping Buildings 1 and 2, Ar. Espina saw an opportunity to accommodate the increasing spatial needs between the two existing buildings. This was when she and then College Secretary Ar. Del Castillo had a conversation that led to the inception of a studio laboratory building. On paper, the structure was long and elongated, primarily positioned where the amphitheater now is. Figuring out the perfect fit for the building posed some challenges which resulted to several awkward configurations. There was also the risk of ending up with three buildings that were not in harmony with each other. There was also the probability that the third building in the middle of the complex will not have the same "look" architecturally as the previous structures. But one thing that both of them agreed upon was to align of the proposed building along the North-South axis. To them, this was non-negotiable.

To connect Buildings 1 and 2, plans for a bridge designed by Ar. Bronne Dytoc and Engr. Ruel Ramirez were presented to and approved by the previous college deans. Already approved by the faculty, Ar. Espina honored the intention to build the bridge and saw its completion. Since the bridge was deemed more urgent, the proposal for the third building was shelved temporarily and its proposed location eventually was converted into an outdoor amphitheater. Tall *Eucalyptus deglupta* or *Bagras* trees, growing gracefully on its steps, mark this outdoor space. Other projects involved fixing worn-out roofs and parking areas, and addition of plants along the entrances to give the complex a more natural welcoming ambiance. Picking up from Ar. Del Castillo's idea, Ar. Espina had more time on her hands to ponder on the location of the proposed building, eventually deciding to construct on the open area at the back of Building 2.

The North-South orientation is the most important aspect of the proposed building. A centerline runs all the way to the auditorium that was attached to the rear side of Building 1. The auditorium followed the axis of Building 1, but its entrance was skewed and oriented to follow the axis of the proposed third building.

Proposed Studio Laboratory Building

Several ideas were thrown around. Initially, the first storey will be used by the Bachelor of Landscape Architecture (BLA) students while three floors will be occupied by Bachelor of Science in Architecture (BS Arch) students. Another was that only third year students and upper year levels shall occupy the new building, while the first and second years shall remain in Building 1. But that setup seemed unfair for incoming students so the faculty came into an agreement that all students will occupy Building 3 for their studio works. Thus the risk of construction of a taller building with the addition of two more floors would be risky. But it was a risk that Dean Espina dared to take.

Ar. Espina collaborated with Toymi Imao, a UPCA alumnus and a multi-media visual artist, to come up with a mock up design of the façade. She requested Toymi to make a design impressive enough to have a distinct look, exclusive to the College of Architecture and not like any other building in the campus. The artist made perspectives of the façade and placed four caryatids in front of Building 3. ***"Ang gusto ko, isang design na tayo lang talaga makakagawa, walang gusto kumopya,"*** Espina says describing the potential façade design.

Figure 3. Aerial view of the UPCA Complex showing the three major buildings.
Source: UP Office of Design and Planning Initiatives

Figure 4. View of new buildings – Studio Laboratory Building (left) and Auditorium (right) within UPCA Complex.

Images of the perspective of Building 3 were released online and the proposed building was criticized on social media. People found the caryatids unattractive. One comment was all it took for others to join in and post negative comments about the façade. Ar. Espina called a town hall meeting to clarify issues people have regarding the building. Procedures, design constraints, production issues, and fund sourcing were also discussed. A student asked why there was no consultation involved. Ar. Espina said: *"If I consulted you, what would you have told me? What kind of building would you want?"* The student wanted classrooms. She said she did that, even adding a studio laboratory with a space that would last each student the rest of his/her academic life. *"See? You should just trust me because I thought for you,"* she says. *"I'm telling you already, what I'm delivering to you students is really, really nice."*

Building 3 for a while was a hot topic online. Students, alumni and colleagues in the design profession said their two cents worth on Facebook and heavily critiqued the façade of the building. As the online bashers dissipated, Ar. Espina beamingly claims she survived it. She adds, *"I'm still around. I'm finishing it. (And) I think we're going to get a good project, a good building."*

Sustainable Features and Good Practices through Proper Design and Management

MUHON: What is the general design philosophy of the new building or did you have any inspiration behind the design of the building?

"Well it's not so much as inspiration but compliance with Canberra Accord. Canberra Accord is one big goal," Espina says. Canberra Accord is a document signed by international accreditation agencies in architectural education around the world. To be accredited under the Canberra Accord through mentorship of the Korea Architectural Accreditation Board (KAAB), UPCA's BS Architecture will require a studio laboratory facility. ***"I was only driven by the studio laboratory technique of training, of education, and then sustainable design,"*** she adds. With Ar. Del Castillo's idea, the Canberra Accord accreditation and enough funds, the building will materialize at a faster pace.

MUHON: How do the architectural and landscape features of the building reflect the image of the College or the University?

Ar. Espina wanted the construction management, not just the building itself, to be a model of good practice not just in the Diliman campus and in all government buildings as well. She knew that it may seem ambitious at first, but that was her wish. ***"To aim for good practice is already sustainable practice,"*** she claims. It still remains to be seen, whether the College achieved it or not, *"but what's more important is the effort to try." she adds.* ***"What we achieved for you is higher value for the money spent. Those are correct practices."***

The College has at least 50 faculty members who are also design professionals, and the brand of the University will always be at the center. The College prides itself to be the mold where the finest of architects and landscape architects are to be trained. Once they see the materials installed in the building, they will personally recommend the quality materials and workmanship that contractors provided and use it for their own future projects. ***"Think of the number of architects here. Then you put a value to it. They will forever remember that you supplied this,"*** she usually says to the suppliers. This is the advertisement that contractors can use – an actual project.

The most evident sustainable feature of the Building 3 is its position along the north-south axis. Windows facing the east and west are larger than those fronting the north and south so that fresh air will enter each of the individual faculty rooms. Building orientation is the first feature. ***"That's the highest Energy Efficient Rating (EER) given. And that's compliant with sustainable design,"*** Espina says.

The building's outer skin is another important feature to cool the building. On the north and south sides, a skin was created to filter air before it enters the hallways and rooms. Particularly in sustainable architecture, it is an important feature that countries consider especially in warmer countries. The space between the outer skin and the building itself cools the air. Potted bougainvillea plants shall climb on this skin. Of all the climbers, bougainvillea plants thrive best in containers even when exposed to harsh conditions like rain and extreme heat. ***"The more contained the roots, the better they flower,"*** she describes the bougainvillea plants. Even if regular watering is limited, it still thrives.

The windows are large enough that you could leave two-thirds of the expanse open to receive more than enough light and a breeze of cool air. Columns are spaced nine meters apart, thus the opening in between them is roughly around eight meters wide. This has six panels of sliding windows – four of which are sliding while the remaining two are fixed in place. Students can freely open the windows with the outer skin still providing protection. So on ordinary days, there is plenty of air and less need for air conditioning. During severe weather conditions, students may need to close the windows but airways are provided under the raised drawers to allow air to pass through.

A ledge of at least 60 centimeters deep is placed by the windows, designed with drawers to provide additional storage. Each student shall have his or her own locker to store materials and tools. The ledge can also serve as a resting area where students can lie down and take naps. This is considered a sustainable design approach to address mental health. It is necessary to provide spaces to de-stress and unload. ***"The University is a highly stressed environment. But you can create de-stressing areas within your buildings,"*** she says. These little nooks are where students can interact with each other. ***"Because we are a creative College, to lie down and sleep and daydream is part of the creative process. And I will deliver that to the College,"*** she claims. These ledges provide views of the outside for season discernment. Being aware of the weather outside is significant to one's overall health. In this building, students will be able to get well without missing classes. Students can simply lie down on the ledge to daydream while enjoying the outdoors. Students being more creative and can accomplish more during night time are already a measure of productivity. ***"Mental health and***

productivity level are counted here," she says about these design considerations. Ar. Espina believes that sleep deprivation is bad for one's health; that is why getting enough sleep, even if some are done in the daytime, is of utmost importance.

The partitions between the studio rooms and the outside corridors look like steel grills with odd patterns for displays and pin ups. Ar. Espina patterned the individual frames to A3-size papers. The plates can easily be changed, depending on the class output.

Each floor has its own pantry and kitchen, where the faculty can privately eat lunch and sip coffee. The faculty will take responsibility of maintaining the cleanliness and orderliness of this space.

The toilets are designed for individual use only. Each studio room has its own toilet. The toilet has a small space so that students will learn to maintain the cleanliness of the toilet themselves. ***"Not to be dependent on the janitors – that is also good practice,"*** Espina says. As compared to a large toilet with several stalls that can be used and shared by a number of people at the same time, the toilets in Building 3 are meant to feel personal. If one feels that the toilet is a personal space, the student tends to be more cautious on how to use it. Students can be trained to make the toilet seat clean and the counter dry using rags and toilet washers that the College will provide. Teaching them how to clean a small space such as this, results to discipline. The toilets are designed ergonomically and appropriately applied, setting a standard on how students should properly design. ***"We're setting the standards that they will use in practice. And then they can use it in their own homes. They will improve their lives too,"*** she explains. ***"So I think we will have some points on improving the lifestyle of our students. Leadership in Energy and Environmental Design (LEED) does not make a rating of that."***

The corridors at the upper floors surround the atria at the center, with the proposed vertical garden standing on one side against the wall surface. Students can easily pull out chairs along the corridors and enjoy the vertical landscape. ***"So you have all opportunities to enjoy nature, to enjoy (the) landscape,"*** Espina further describes. Looking down the atria, plants will adorn the courtyards on the first floor. The vertical landscape can be a canvass that is alive and ever thriving. Perhaps, this living canvass will be changed annually, just like how the UP College of Fine Arts changes the mural in front of their building every year. She says, ***"We can keep the plants permanent if you want, but it should be a living canvass, a mural."***

Ideally, drip irrigation systems will be installed in the gap between the vertical garden and the wall so that the water supply can reach the top floors. This makes the living mural easier to design.

A garden is provided at the roof deck area. The space can be set up with tables and outdoor furniture. A raised platform for those who want to unwind by singing, strumming instruments, dancing, and even doing exercises will also be placed in the area. This is a way for the faculty to de-stress too.

Figure 5. Lobby area at the ground floor level of the UPCA Studio Laboratory Building.

Figure 6. View of the studio, faculty rooms, and open atrium within the UPCA Studio Laboratory Building.

Figure 7. View from the rear balcony of the Studio Laboratory Building of the Bridge connecting UPCA Buildings 1 and 2.

Figure 8. View of a portion of the roof deck area of the UPCA Studio Laboratory Building showing the pedestals for solar panels and water storage tanks.

The building will have the first bicycle parking on campus. Showers will be built at the rear side of the building near the pump room and will be opened to the entire University, until such time that respective units can provide their own facility. This promotes a healthy lifestyle of bicycle use in the campus, especially now that some faculty members of the College use their own bicycles coming to work. Hopefully, this will influence other colleges to do the same.

Other features of the building include provisions for rainwater and variable refrigerant volume (VRV) air conditioning systems. There is also an allotted area at the roof deck for solar panels. **"*The lowest hanging fruit is the building orientation, which we achieved already. The solar panel is the highest hanging fruit of sustainable design,*"** she claims. The power generated from these solar panels will decrease the College's dependence on outdoor electric power sources.

MUHON: How do the articulation of the design and the allocation of spaces in and around the building embody Filipino culture and society?

"*The fact that our building is naturally ventilated, it's responsive to the Filipino conditions, Philippine climate,*" she starts. **"*Yung Filipino culture in architecture kasi is largely dictated by our response to climate.*"** Traditional houses have spaces underneath that could act as air passageways. But Building 3 does not have that specific feature. Instead, the sides of the building were designed to become air passages. Ar. Espina further described a feature that she wanted to incorporate to the overall design but did not materialize, **"*I was going to put pipes that will carry cold water inside the floor of the gallery. We call the ground floor the gallery, yung open space na yan (that open space). If you put the pipes there, and you just allow cool water through it, it will cool the slab. And then a cool slab will cool the air above it.*"** She tried to replicate this principle from a building that she visited in Aurora province. One of the buildings was elevated due to the area being flood-prone. When she entered one of the closed rooms, she noticed immediately that it was cooler than usual. Apparently, the high water table keeps the soil moist. The coldness of air is transferred to the floor and to the building interior. Although it was not incorporated in the final design of Building 3, cool breeze passes through the ground floor level. In the end, there was no need for the installation of the pipes after all.

MUHON: How does the new building blend or interact with its immediate surroundings and with the urban fabric of the campus or what will make it stand out?

Building 3's connection to the other buildings has been an important consideration right from the beginning. The bridge that connects Building 1 and 2 will be extended to link Building 3 to assure that students carrying plates and models can move from one building to the other without worrying about getting wet in case of rain.

The amphitheater has been an area for quite an interesting mix of outdoor activities like students playing games or enjoying the lawn. If the space can be used to accommodate all these functions, then it has achieved its purpose, which Ar. Espina even challenges LEED to rate experiences that enhance human well-being. **"*How do you measure human well-being? Isn't that good design?*"** she asks. It has become a place where people remember good times, a place for memories. This is how the College can be remembered when people share their own experiences about it.

Project Considerations and Challenges – From Conceptualization to Construction

Providing ample work spaces for the students is a planning challenge that is prioritized. Students should be given enough space to put drafting materials on the table and a laptop at the side. **"*When students have enough space to maneuver and move around, it increases their capacity to become good designers,*"** Ar. Espina explains. The challenge ahead lies in making everything work and teaching students proper discipline.

What's ahead for the practice of Architecture and Landscape Architecture in the Philippines?

The practice of architecture and landscape architecture in the Philippines has a lot of lessons to impart, most especially to the students of the College who are groomed to be the best in their professional fields in the future. **"*The newly constructed Building 3 for now tried to achieve the goals of sustainable design, well-being of man, concepts of memorability and legibility in the urban fabric of the campus,*"** Espina says. Design may be subjective, but in time, she hopes that the building can be used as proof *"that the concepts and principles could actually work."* Both designers and contractors can be seen playing an important role in the success of a project to achieve good practice, as long as they keep an open dialogue.

The UP College of Architecture has always kept its doors open to the watchful public, welcoming both the critic and the hopeful. It strives to listen to the inquisitive and the naysayer, finding balance to what design should be and what it could be.

After all has been said and done, the UPCA will thrive amidst changing landscapes by continually answering the call of a generation who dreams of making the world better through design, research and instruction. Some may see the UPCA Complex as a learning space made up of buildings while others regard it as a second home where memories are made. As we make meanings out of shared experiences that come from the people we interact with and the places that we shape, the values that we attach to the buildings and open spaces of the UPCA Complex essentially evolve as well, affecting the world as we know it.

MUHON Photography Contest

As part of this issue's feature on the new Studio Laboratory Building of the UP College of Architecture, the MUHON Editorial Team has invited interested students, faculty, staff and alumni of the University to join the MUHON Photography Contest, with the said building as the subject of interest. The idea behind the contest is to showcase different creative and artistic views of various stakeholders on several details of the new building—architecture, landscapes, spaces, sculptures, and other elements—through their lenses.

Submitted entries must be originally photographed with minimal or no alterations by the registered participants. Photo entries were scored and selected using the following criteria: expression or highlight of the architectural features, quality of the photo, lighting and angle, and creativity and composition. The winning entry, with focus on the outer skin of the building along its north side, was then used as the main cover photo for this issue. The photo entries of the runners up were also used as back cover and filler image.

Stephen George Sy
First Place Photo Entry
Main Cover Photo

Cathyreen Gulada
Second Place Photo Entry
Filler Image

Dale Jon Cortez
Third Place Photo Entry
Back Cover Photo

Architectural Research Colloquium (ARCo)

In celebration of 63 years of existence, the UP College of Architecture (UPCA) is organizing the First Architectural Research Colloquium (ARCo) during the HARAYA 2019 festivities, a biennial College event featuring the works of the undergraduate and graduate students and faculty for the past academic year. Scheduled on the third day of the first week of HARAYA 2019, ARCo shall serve as a showcase of research works of graduate students in their respective classes and the research efforts of members of the faculty. The pilot edition of the colloquium is organized by the UPCA Research and Extension (REx) Office in collaboration with the Graduate Programs for both Architecture and Landscape Architecture.

The goal of institutionalizing the said colloquium is to provide a venue to present recent progress, developments, collaborative or interdisciplinary work, and new approaches regarding the research endeavors of the faculty and graduate students under the Master of Architecture (MArch), Master of Tropical Landscape Architecture (MTLA), and other new degree programs under the Integrated Graduate Program (IGP) such as the Master of Arts in Architectural Studies (MAAS), Graduate Diploma in Landscape Studies (GDipLS), and Doctor of Philosophy in the Designed and Built Environment (PhDDBE).

The objectives of ARCo are as follow:

- Enhance and update current research practices in the Architecture, Landscape Architecture, and the Designed and Built Environment;
- Get constructive feedback from faculty and resource persons;
- Inspire and enjoin graduate students to make researches that will contribute to the body of knowledge;
- Build networks of next generation researchers; and
- Enhance communication and presentation skills.

The academic papers to be presented in the colloquium shall be divided into three major categories:

A. Faculty Research Papers;

B. Graduate Research Papers; and

C. Graduate Thesis Works.

UPCA Faculty with Research Load Credit or Creative Work Load Credit (RLC/CWLC) are invited to present updates of their research/creative work endeavors as part of the requirements indicated in the College guidelines for assigning RLC/CWLC to the faculty members. A plenary session has been dedicated for this category to allow the faculty to disseminate their research projects to other stakeholders of the College and the general public.

Figure 1. Architectural Research Colloquium (ARCo) logo. The letter "C" (green and gray) symbolizes ripples coming from the red dot (letter "O") and signifies the dissemination of the College's academic research and creative works to the public.

Figure 2. HARAYA 2019 promotional poster for ARCo.

Source: Haraya Facebook Page (https://www.facebook.com/UPCAHaraya/)

Under the category of Graduate Research Papers, students from the graduate programs (both Architecture and Landscape Architecture) are required to present their works from their classes in front of an audience. Research papers for presentation are further divided into three sub-categories:

- Emerging Research are papers that explore possible research topics (that may or may not be developed into a thesis/dissertation);
- Developing Research are papers that provide updates on papers that have been presented under the sub-category of Emerging or is part of an ongoing research project/program; and
- Realized Research are papers that have been done during the semester complete with results, discussion, and conclusion.

For each session, time is allotted for panel reaction from the faculty at the end of all paper presentations. This allows the faculty to comment and critique on how to further improve and elevate the level and quality of the research works of graduate students. An open public forum follows afterwards for sessions under the Realized Research papers sub-category.

The Graduate Thesis Works – masters or doctoral – are grouped into three levels: Proposals, Updates, and Thesis or Dissertation. The colloquium serves as a venue for graduate students not only to present and share their final works to the public but also to promote collaboration between them, the faculty, and interested parties to improve their thesis or dissertation.

To help the graduate students in preparing their research presentations for ARCo, an outline was given to them to serve as a guide:

- General Questions
  - Why is your research important?
  - How did you do your research?
  - What did you find out?
  - What do the results mean?

All papers presented by the students and faculty in the colloquium may be further improved, revised, and submitted by the authors for consideration and possible publication to the College's official academic journal, MUHON.

Institutionalizing ARCo in the College may also lead to possible research collaboration between students, faculty, and interested parties within or outside the University, including other public or government institutions, agencies, and design professionals in the designed and built environment. With the implementation of the new Integrated Graduate Program or IGP, interactions on research programs and projects between different studio laboratories of the College can be strengthened and highlighted the yearly academic activities of the faculty and students.

MUHON Call for Papers

Format and Procedures

Interested authors are requested to prepare papers and essays with a maximum of 7000 words (excluding captions of tables, images or figures). The following are unacceptable for publishing: simultaneous submissions to other journals, previously published work, or work which is substantially similar to previous published work. Contact the Editorial Staff of MUHON (through email or visit to the Research Office of the UP College of Architecture) for any query regarding this requirement.

A submitted paper for possible publication will be blindly reviewed by international experts in the related topic or field of study. The template for the paper format can be downloaded from the UP College of Architecture website (**http;//upca.upd.edu.ph/**). The Call for Papers is open all throughout the year. Authors may submit their abstracts and full papers or manuscripts (Word file) to **muhon@up.edu.ph** together with the accomplished and signed Copyright Agreement Form.

Review Process

Initial screening of papers is done by the members of the Editorial Board. After the first revision, the manuscripts are then subjected to a double blind peer review, which means that both the reviewer and author identities are concealed from each other throughout the entire process.

Reviewers from various local and international academic institutions are invited to be part of the Pool of International Reviewers of MUHON. All of the invited referees are experts in their respective fields of specialization. Papers are assigned to them for review according to their expertise and are given enough time to evaluate the manuscripts if they are publishable or need revisions.

Authors shall be notified of the comments of the reviewers on their manuscripts, as well as confirmation by the reviewers that the papers are deemed publishable to the journal.

References and Works Cited

Prepare a bibliography to contain key references for the article, plus the author's judgment of the most important reference sources on the topic. Follow the format of the American Psychological Association (APA), which emphasize on the date a work was created. Book citations in APA generally require author's name, publication year or last edited date, work title, publication city, and publisher. Arranged the references alphabetically (based on main author's surname or title of literature for references without author indicated).

Terms of Publication

Upon acceptance of the Title and Abstract, the authors must be committed to abide by the schedule provided by the MUHON Editorial Board. Also, the contributors shall be responsible for submitting pictures or images with a resolution of at least 300 dpi, clearly labeled (with required photo credits). Obtain permission, pay royalty fees, etc., as may be required for the reproduction of illustrations taken from other sources.

The contributor, in turn, waives any royalties for the publication of his/her article, as the UP College of Architecture (UPCA) is a non-profit organization. The copyright for the published work belongs to UPCA and its selected publisher (if any). The contributor is free to publish a modified version of the same article in other publications.

The contributor guarantees that:

- the article does not infringe on the copyright or any proprietary right of any other person;
- the article contains no libelous or other unlawful matter; and
- the article makes no improper invasion of the privacy of any other person.

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As a research university,
the U.P. College of Architecture
is responsible for disseminating
new body of knowledge.

Thus, MUHON is published
as a vehicle for reaching out
to other architectural schools,
building architects and landscape architects in the academe,
in the architecture and design professions
and to the public at large.

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