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Journal in Urban and Regional Planning

UP School of Urban and Regional Planning
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About the Cover

At a glance, the Journal in Urban and Regional Planning (JURP) 2019 issue cover might look like a departure from the previous cover designs, but really it is the classic landscape imagery rolled into a cylindrical view. But this time, the scene is sliced into different layers to emphasize the multi-dimensional considerations in planning. Crafting plans involves paying close attention to the different aspects of our society and environment, and zooming out to see how they stack up and interact to create a unified image.

The circular depiction is inspired by the zoetrope, an early animation device depicting a series of images that are spun to simulate movement. Much like a zoetrope that needs spinning, the methods and procedures contained in the plans will remain static when they remain untouched. As the metaphor goes, the essence of a plan is to be set in motion.

It is in the earnest hopes of the UP School of Urban and Regional Planning (SURP) that the seeds of knowledge disseminated through this journal would indeed take root and be steadfast drivers of change.

About the Logo

The JURP logo is depicted as a stylized dandelion framed against an open doorway. Dandelions are hardy survivors capable of thriving under adverse conditions. These plants are firmly anchored in place making them very difficult to remove. Since the seeds are windborne, these plants proliferate successfully. As such, the dandelion symbolizes triumph over adversity, persistence, integrity, and replication. The dandelion seeds depicted in the logo represent ideas being disseminated and their passage through an open doorway symbolizes JURP's thrust to make studies, concepts, and innovative ideas in urban and regional planning readily available to a larger audience.

The UP SURP believes in sowing seeds of change through its fourfold mandate of graduate education, research, training, and extension services. The journal serves the purpose of disseminating scholarly insight on prevailing issues shaping our urban and rural systems and is geared towards elevating the practice of urban and regional planning professionals; most especially those engaged in the local planning arena.

Foreword

Dina C. Magnaye, PhD, EnP
Dean
UP School of Urban and Regional Planning

The UP SURP is dedicated to generating, sharing, and exchanging knowledge, exemplified through the annual publication of scholarly work in the School's official publication, the Journal in Urban and Regional Planning (JURP).

The 2019 edition marks the sixth issue of JURP, showcasing UP SURP's ongoing commitment and contributions to urban and regional planning and its allied disciplines. This issue covers diverse topics on disaster preparedness parameters and resilience measures at the local government level, operating environment factors that inform suitable bank branch location, and the humanitarian supply chain in the context of climate-related hazards.

The first paper presents a resilience assessment framework designed for local governments. This framework can be integrated into their existing assessment for disaster preparedness, promoting both operational preparedness and accountability in building community resilience. The second paper explores various location-decision factors and policy interventions that guide the planning of suitable locations for physical bank branches and the financial district's role, through bank and financial institutions, in fostering urban development. The last paper offers valuable insights into risk-informed site selection by using geospatial analysis. It aims to understand the number and location of assets at risk to various hazards, facilitating informed decision-making. These timely studies offer practical solutions to contemporary issues on community development and disaster resiliency. They provide valuable frameworks and insights that can be applied to enhance resilience and support sustainable urban growth.

JURP is a peer-reviewed journal geared towards disseminating the scholarly work of the UP SURP on sustainable practices in urban and regional planning and related fields, such as the environment, transport, estate, and public works, among others.

The JURP widens its dissemination and visibility online through the UP Diliman Journals Online. In addition, the UP SURP has linked the JURP online platform to online knowledge resources by non-profit organizations and research institutions such as the Socio-Economic Research Portal of the Philippines (SERP-P) of the Philippine Institute for Development Studies (PIDS), the Philippine Social Science Council Online Resource and Open Access, among others.

My sincerest appreciation to the authors who entrusted us with their articles, and the Editorial Board and reviewers who provided invaluable feedback. I also commend the staff of the Office of Research and Publication for their hard work in compiling, laying out, and editing the papers to produce this final version of JURP.

I hope this issue resonates with a wide audience and broadens their knowledge in the field, while also encouraging more researchers to contribute their work to advance understanding in urban and regional planning.

Call for Papers

The UP School of Urban and Regional Planning (UP SURP), through its Office of Research and Publication (ORP), ***accepts articles concerned with urban and regional planning and its allied disciplines such as public works, transportation, real estate development, and the environment- both built and natural, among others regardless of geographic context year-round.*** We welcome contributions that:

- Cover topics of immediate and long-term concern for the urban and regional planning practice in the Philippines; and
- Are grounded on sound theoretical and/or practical analytical frameworks

Authors are encouraged to submit their typeset manuscripts following the Instructions to Authors and required formats along with other forms as email attachments. Inquiries and expressions of interest may be addressed to:

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To find out more about JURP, check out the submission guidelines at:
https://bit.ly/SURP_JURP_Submission-Guidelines.

INSTRUCTIONS TO AUTHORS

Pre-publication Status
Articles must be original and unpublished works by the author/s. Works to be submitted should have been written not more than five years before the date of submission to the JURP. The paper cannot be submitted simultaneously for publication elsewhere.

In case an article was previously published in another journal, appropriate document/s indicating that the requisite permission for the republication of the article, and any conditions for said permission, have been complied with and shall be submitted upon acceptance of the article for publication.

Journal Subject/Content
All articles to be published in the journal shall be studies covering topics of immediate and long- term concern for the urban and regional planning practice, are grounded in sound theoretical and practical analytical frameworks, and of good quality that will stand up to the scrutiny of a peer- review process.

Language
The articles to be submitted shall be in American English.

Manuscript Preparation

General
Articles to be submitted for publication in the JURP should be in Microsoft Word format, in A4 paper (21 cm wide by 29 cm long), and following margins of 2.5 cm/1 inch (upper, lower, left, and right hand).

Use Times New Roman font in the following sizes for the text:

- The title of the paper should be centered using an 18-point pitch
- Each author's name, institutional affiliation with address, and e-mail address should be provided. The author's name should be typed using a 12-point font size. The institutional affiliation, address, and e-mail should be typed using an 8-point font size.
- For the body, font size is a 9-point pitch
- Line Spacing: 12 point
- Indent and do not leave a blank line between paragraphs.

The maximum length of the article is 15 pages, including figures, tables, references, and appendices. Do not add anything in the header and footer.

The article should be accompanied by a Manuscript Submission Form bearing the following:

- Author's full name, current position, institutional affiliation with complete address, contact numbers, and e-mail address
- Co-author/s full name, current position, institutional affiliation
- Title of the Article
- Keywords
- Author Certification

Articles should be laid out using the template provided by the Office of Research and Publication (ORP) which bears the official journal identifier and format for the publication (downloadable at the UP SURP Website).

Abstracts
A 250- to 300-word paragraph that outlines the objectives of the research, as well as its scope and conclusions, should be submitted along with the article.

Keywords
A maximum of five keywords should also be submitted for indexing and access purposes. All keywords are to be written using lowercase, italicized, and separated by a comma. Keywords should appear after one blank line after the abstract. Authors are encouraged to include Sustainable Development Goals (SDGs) among the keywords.

Paper Organization

First page: The title of the paper should be centered using an 18-point pitch. Each author's name, institutional affiliation with address, and e- mail address should be provided. The author's name should be typed using a 12-point font size, while the institutional affiliation with address and e-mail should be typed using an 8-point font size.

After a blank line below the information of the author(s), an abstract ranging from 250 to 300 words; and at most five keywords should be placed. After two blank lines, the main body of the paper follows, divided into sections and sub- sections when necessary. The sections must be numbered, and their title typed using an 11-point pitch size (e.g., 1. Introduction).

Sections must be numbered using two digits and their title typed using a 9-point font size (e.g., 2.1 Developed Models). There should be two blank lines before each title of the sections except for new pages. One blank line must be left before the title of the sub-section except for new pages. New paragraphs are to be indented. Listings should be indented as well.

The paper will be organized as follows:

1. Title, Author/s information, abstract, and keywords
2. The chapters of the main text are numbered as indicated above
3. Endnotes
4. Acknowledgements
5. List of References
6. List of Figures with captions and sources
7. List of Tables with sources
8. Appendix, if necessary

Sections

The body will be divided into chapters. Adding sections and subsections under each chapter to organize the flow of the discussion will be left at the discretion of the Author/s. Paragraphs should be separated by one blank line.

Citations and References

All texts lifted or directly quoted from references are to be indented and italicized.

Use endnotes numbered consecutively using superscript Arabic numerals.

All bibliographic entries should follow the standard APA format. It is essential to include author(s) name(s), journal or book title, article or chapter title (where required), year of publication, volume and issue (where appropriate), and pagination. Digital Object Identifier (DOI) numbers are not mandatory but highly encouraged.

Examples of in-text citations are author and year format, e.g. Dela Cruz (1986) or (Dela Cruz, 2019). Personal communication (including in- person interview, email, phone interview, text/FB messenger message/chat) should be cited as follows: Castro, A.G. (2021, April 1). Personal interview.

All references cited in the text must be listed in the References section. References should be arranged as they were mentioned in the paper. The complete bibliographic entry should be at the end of the manuscript under the References Section, as follows:

Sample APA Bibliographic Entries

Book:
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Article in journal:
Cabrido, C.A., Jr. (1999). Ebbing coasts coastal area planning. In *Philippine Planning Journal,* 30, 2, 1-12.

Unpublished thesis or dissertation:
Juanico, M. B. (2007). *The selectively linked autocircuits model (SLAM): An alternative response to the development problematique of developing countries.* Unpublished doctoral dissertation, University of the Philippines School of Urban and Regional Planning.

Online sources:
Website:
GVU's 8th WWW user survey. (n.d.).
Retrieved August 8, 2000, from http://www.cc.gatech.edu/gvu/user_surveys/survey-1997-10/

Newspaper article:
Bonabente, C. L. & Avendaño, C. O. (2008, July 22). 14.5M experienced hunger, says SWS. *Philippine Daily Inquirer.* Retrieved August 5, 2008, from http://newsinfo.inquirer.net/inquirerheadlines/nation/view/20080722-149870/145M-experiencedhunger-says-SWS

Figures and Tables

Format of Tables

Tables must be numbered sequentially, and have a reasonable explanatory title centered above the table. The measurement units employed in the table must be indicated. Font size for the Table title, as well as the contents of the table, should be an 8-point pitch. Sources for tables should be placed below the table using an 8-point pitch.

Table 1. Land Area per Hazard Category in Tacloban City

Hazard	Category (in hectares)		
	Low	Moderate	High
Flood	1175.2	908.0	301.7
Storm Surge	154.3	488.0	1655.0
Rain induced Landslide	449.2	1760.1	2835.9
Multi-hazard	944.3	2617.9	4532.3

Source: Tumamao-Guittap et al. (2020)

Format of Figures

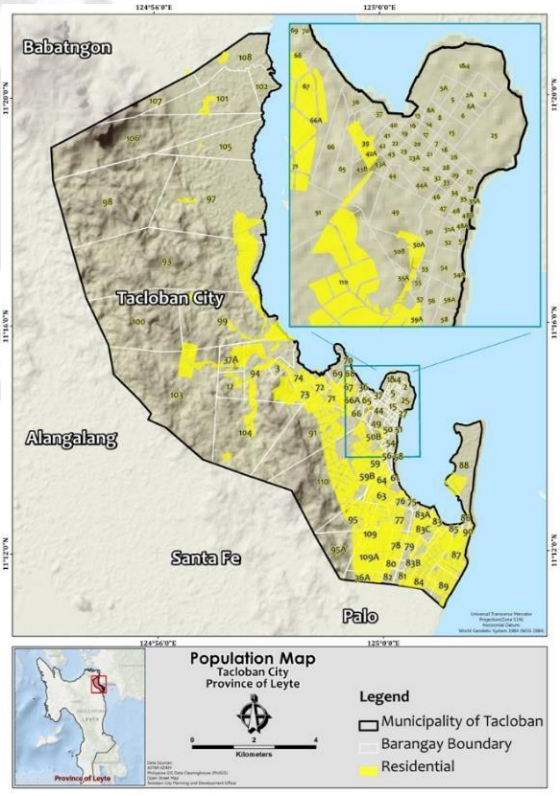
Figures must be drawn using good-quality graphic software, and they must be numbered sequentially, and have a reasonably informative title, centered under the figure.

Sources for figures should be placed below the figure, above the figure title using an 8-point pitch. The font size for the Figure title is 8-point pitch.

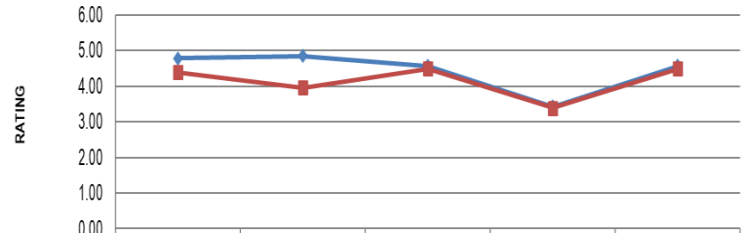
In general, creating your figures in one of the file types (EPS, AI, TIF, or PNG) is recommended. These may be converted or flattened to a high- resolution JPEG or PDF file later.

Line drawings must be of good quality, with all letterings, graph lines, and points on graphs sufficiently large and clear. This is to allow for reproduction and scaling without loss of detail when reduced to or enlarged to the size suitable for publication.

For line art such as graphs, the resolution needs to be higher than images, as each line must be more precisely rendered. Using larger fonts for the labels makes for easier reading. Ideally, the images should be 80 mm canvas size or pixel dimensions (width): 1800px minimum.



Source: University of the Philippines Nationwide Operational Assessment of Hazards (UP-NOAH)
Figure 1. Population exposure map of Tacloban City



	P3 S1	P3 S2*	P3 S3	P3 S4	P3 S5
Case Group	4.79	4.86	4.57	3.43	4.57
Control Group	4.39	3.96	4.50	3.39	4.50

Source: Tumamao-Guittap (2015)
Figure 2. Awareness of energy-related concepts among tourist accommodation providers in Coron, Palawan

Authors must include camera-ready, high-resolution images (preferably 300 dpi or higher) separately from the document. Pictures should be in JPEG, TIF, PDF, or PNG format. These must be labeled using the following format: Fig. (number)_label on the article.

Along with these, a Figure Submission Checklist with a Figure Summary Table is to be submitted for reference by the Editorial Team. This may be found on the second and third page, respectively, of the Manuscript Submission Form.

Have all diagrams, maps, and photographs labeled as figures and numbered consecutively in the text of the report.

All figures should be numbered in Arabic numerals (1.1., 1.2., 2.1., 2.2., etc.). For figures, place figure numbers and headings below the table/figure, and position source information and notes below. For tables, the table numbers and headings are placed on top, while the source information and notes are provided below.

Figures, tables, and images should be discussed before their appearance and should be cited properly (e.g. Fig. 1.1, Table 1.1).

All figure and table titles must be written using sentence case format (upper case letter for the first word, lower case in the succeeding words). All figures and tables must be submitted in editable form for layout purposes.

Format of Equations

Equations must be written preferably with the same word processor used for the rest of the text, without handwritten symbols to aid legibility. Equations must be numbered sequentially, with their numbers in parenthesis and right justified. Symbols used in an equation should be defined immediately following the equation that was first used, as shown in the sample format.

Example of Equation:

The model can be formulated as follows:

$$\max_{y} f(\mathbf{y}, \mathbf{b}, \mathbf{x}^*, \mathbf{x}^*) \quad (1)$$

$$\text{s.t. } \langle \mathbf{c}(\mathbf{x}^*), \mathbf{x} - \mathbf{x}^* \rangle \geq 0 \ \forall \mathbf{x} \in K, \quad (2)$$

$$\langle \mathbf{c}(\mathbf{x}_0^*), \mathbf{x}_0 - \mathbf{x}_0^* \rangle \geq 0 \ \forall \mathbf{x}_0 \in K_0, \quad (3)$$

where,

y: set of freight network improvement actions,
b: vector of investment cost,
x: vector of link flows,
x*: vector of equilibrium link flows,
$\mathbf{x_0}$**:** vector of link flows w/o project,
$\mathbf{x_0^*}$**:** vector of equilibrium link flows w/o project,
c: vector of link user costs,
K, $\mathbf{K_0}$**:** feasible constraint set.

Written Text and Numbers

For use of numbers, one to nine should be spelled out (worded, not numerical), while numbers ten and above may use the numerical form.

For percentages, the full word "percent" should be used in the text following the spelled out number (e.g. nine percent), while the symbol "%" may be used after any number expressed as a numeral (e.g. 9%), and in figures and tables.

Hyphens may be used in titles, but the word "to" is to be used in text form (e.g. from 9:00 AM to 5:00 PM).

Avoid contraction of words (e.g. don't, wouldn't). They must be written separately (e.g. do not, would not).

Abbreviations should be spelled out when first mentioned, and abbreviated forms may be used in succeeding sentences. Abbreviations and numbers in numerical form should not be used to start sentences.

Submission

Authors must check if they have complied with the submission requirements listed below. Contributions will be returned if they do not comply with the journal format and requirements.

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2. Articles should be accompanied by a completed submission form which may be accessed through: https://forms.gle/jh5swbcXybYWyoEc8
3. All pages should be numbered (pagination will start after the cover page); and,
4. Further inquiries may be sent to:

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Plagiarism Policy

The University of the Philippines is a firm believer in intellectual honesty. Authors are expected to self-check and ensure that their submissions respect the intellectual property rights of others.

The JURP Editorial Committee adheres to the anti-plagiarism policy of the University and reserves the right to judge any case of which they become aware of (either by their knowledge of the subject matter and reading about the literature or when alerted by referees and/or by the plagiarized party) on its own merits.

Please note that the following instances will merit the rejection of the article and its subsequent pullout from publication:

- an author attempts to pass off someone else's work as his or her own,
- an author reuses substantial parts of his or her published work without providing the appropriate references including acts ranging from getting an identical paper published in multiple journals
- instances where an author simply adds small amounts of new data to a previous paper; or
- when large chunks of text have been cut and pasted without proper attribution.

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Once an article is accepted for inclusion in the journal, authors are required to sign the Publication Agreement before its publication. This agreement will enable the journal, through UP Diliman, to protect the copyrighted material for the author/s, while retaining the author/s' proprietary rights.

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Assessment of Disaster Preparedness Parameters and Disaster Resilience Measures for Local Government Results-Based Monitoring and Evaluation

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Abstract

The 2015 Sendai Framework for Disaster Risk Reduction (SFDRR) calls for a more robust assessment of local disaster risk reduction efforts against resiliency targets to foster greater accountability in building resilience. However, resilience is a complex concept that does not neatly square with accountability. Often, it challenges established disaster risk management (DRM) performance assessments due to diverse interpretations and analytical measures. This study examined the Department of Interior and Local Government (DILG) annual Disaster Preparedness Audit (DPA) and its potential to measure resilience. It compared current disaster preparedness parameters against widely applied measures of disaster resilience. Different concepts of community resilience and assessment models surfaced conceptual and methodological requisites that can benefit the DPA model. The DILG and other DRM agencies validated the results, which point to the absence of a common analytical language and the high mutability of performance metrics that lack a logical structure. Findings suggest that local governments mediate community risk reduction through a network-driven approach. Further collective risk management strategies can be contractible despite their diversity, provided these are structured to deliver minimum measurable results. This study recommends a conceptual boundary for local government resilience and the operational considerations to inform the configuration of current assessment practices for Local Government Unit (LGU) disaster preparedness while fostering accountability.

Key words: local government, disaster resilience, risk governance, organizational capacity, measurement

1. Introduction

Disaster resilience largely rests on managing the uncertainties of natural hazards at the community level by mitigating underlying risk drivers (Alexander, 2013). In 2015, the United Nations Office for Disaster Risk Reduction (UNDRR) asserted that resilience-building efforts should run alongside promoting greater accountability through robust assessments against resiliency targets (Malalgoda, Amaratunga, and Haigh, 2015). This assertion holds local public agents of DRM accountable for the outcomes of disaster resilience efforts, thereby requiring robust governance systems and institutions (MacAskill and Guthrie, 2014). The role of local governments as the primary disaster resilience agents draws on the principle of subsidiarity (Zurita, Cook, Harms, and March, 2015). This premise argues that "where practical, governing functions should be devolved to the lowest levels to ensure they are exercised as close as possible to those affected" (Zurita et al., 2015).

Furthermore, it assumes that local governments with greater autonomy (Malalgoda, Amaratunga, and Haigh, 2015) are more effective in reducing the size and frequency of crises (Shaw, 2012). However, the pathways to local resilience are diverse in context, scope, and scale -- making accountability challenging to track. One reason is the different interpretations and measures of resilience. Another is the limited studies on the resilience of local governments as organizations.

Different agencies assess local government performance in disaster risk management for various purposes. Some ascertain the effectiveness of specific programs to benchmark performance and identify entry points for local capacity improvement. Others examine compliance with mandates as a basis for incentivizing and stimulating better performance, like the DPA of the DILG. This diagnostic tool annually tracks local government compliance with disaster preparedness mandates, specifically governance inputs like hazard information, organizational preparedness, emergency preparation, and utilization of DRRM funds.

In 2010, the agency envisioned local government organizations as disaster-resilient (DILG, 2016). However, operationalizing this policy proved complicated due to insufficient guidance on what constitutes a disaster-resilient LGU and its minimum measures. Thus far, performance parameters come from policies of different disaster management agencies without any logical structure or reference to specific outcomes. This situation affirms the challenge of squaring accountability with disaster resilience observed in international policy discourse (Davoudi et al., 2012; Tiernan et al., 2019).

2. Methodology

The study sought to elucidate the concept of resilience applicable to local governments and explored potential resilience performance measures suited for their scale of operation. This study critically reviewed the applicability of resilience elements in local government settings and the measures used in applied resilience assessment frameworks. It examined open-access journal articles and guidance documents on disaster resilience measurement published from 2010-2017. The review parameters drew on different ontological views of resilience capacity relevant to local public organizations. The literature search in February 2018 yielded 429 peer-reviewed articles and guidance documents (i.e., toolkits, policy papers, manuals) on field-tested resilience measurements. Ninety-four (94) articles focused on natural hazards and community-scale risk management capacity. Contextual screening further narrowed the selection to 23 based on these criteria, namely: (a) inclusion of planning authorities and policymakers as among the units, (b) demonstrated application of the method, and (c) inclusion of governance or institutional dimension of resilience. In addition, the author conducted an in-depth review of 26 resilience assessment methods, with the addition of the Climate Change and Disaster Risk Assessment (CDRA) of the Housing and Land Use Regulatory Board (HLURB) and two recently published tools at the time of the study namely, UNDRR Disaster Resilience Scorecard and GEM RPS (Global Earthquake Model Resilience Performance Scorecard).

This review focused on (a) how resilience manifests at the local government level, (b) the minimum elements of resilience assessment that align with performance measurement, and (c) the methodological considerations for assessing resilience.

3. Disaster resilience: catchphrase or realistic target?

Resilience is intuitively a good policy agenda, and there is no debate over the merit of measuring the success of a policy (Schipper and Langston, 2015). However, quantifying the concept faces enormous challenges as it continuously evolves in heuristic and normative disciplines. Moreover, conceptual clarity and practical relevance are needed (Brand & Jax, 2007) in empirical work (Gunderson & Holling, 2002) if policies want to avoid the pitfall of overstretched generality.

In disaster risk management, resilience anchors on human security framing, which underscores social resilience. It centers on how social systems "absorb and bounce back" from a disturbance or shock of various origins, whether human-induced or natural. This ideation characterizes a system's behavior in the face of impending or materializing threat draws (Alexander, 2013; Bogardi and Fekete, 2018; Chandler, 2014; Sharifi and Yamagata, 2016). The concept significantly departs from the precursor framing in ecology as a "condition for ecosystems' sustainability" (Brand & Jax, 2007; Carpenter et al., 2001) but partly aligns with engineering resilience.

Gunderson and Holling (2001) define ecological resilience as a system's capacity to undergo disturbance and maintain its functions and controls through persistence and variability (Brand and Jax 2007). Such capacity is a function of the magnitude of disturbance a natural system can absorb and its ability to assume multiple stable states, including system collapse. On the other hand, engineering resilience focuses on managed socio-technical systems (i.e., transportation, water supply), emphasizing the control of system performance to avoid failure. This paradigm suggests (Bach et al., 2013) that resilience is about efficiency and robustness. A resilient engineered system rapidly resumes its pre-disturbance functions after crossing a tolerable threshold (Sharifi, 2016) following a disruption.

Despite the unpredictability of a social system's reaction to disturbance, public and civil organizations adopt the social resilience paradigm. It describes disaster resilience as a set of capacities to protect and ensure the survival of human systems (Table 1). These definitions agree that disaster resilience capacity is a set of multi-phased and hazard-dependent processes (Table 2) with different outcomes (Asadzadeh, Kötter, Salehi, and Birkmann, 2017; Béné et al., 2012; Matyas et al., 2015). It emerges from tractable resources and an organization's latent capacity to absorb shocks, reorganize amid escalating impacts, and stabilize.

Absorbing, reorganizing, and stabilizing a socio-ecological or socio-technical system refer to broad risk management phases. These all draw on multi-tiered actors, resources, institutional systems, and latent attributes. However, these characteristics are not readily applicable to local governments, owing to their dual nature as an administrative and political subsidiary organization of the national government. Further, resilience outcomes are notably associated with aggregated costs to societal welfare, and communities are identified as the locus of such outcomes. In most studies on community resilience, measures typically scale to the affected or at-risk population's capacities, such as household attributes, resources, and actions.

However, when one envisions disaster-resilient local governments, it presupposes these organizations assume a role and a set of capacities distinct from their constituent community. As administrative and political subsidiaries of the national government, local governments can reduce risk factors external to their constituents by mediating or restraining a community's capacity to respond.

Table 1 Definitions of Resilience Capacity in Disaster Risk Management

	Scale	Scale of Application	How Resilience Occurs
1.	(UNDRR, 2019; UNISDR, 2017; UNISDR & WMO, 2012) (Field et al., 2012) (for IPCC)	System and its components, community or society to exposed hazards; essential basic structures and functions	Ability to resist, absorb, accommodate, adapt to, transform, and recover from the effects of a hazard in a timely and efficient manner, including the preservation, improvement, and restoration of essential basic structures and functions through risk management
2.	Meerow et al., 2016	Cities, urban systems, and constituent socio-ecological and socio-technical networks across temporal and spatial scales	Ability to maintain or return to desired functions after a disturbance, adapt to change, and rapidly transform system elements that limit current or future adaptive capacity
3.	FSIN, 2014	Human or social system attributes, processes, and structures created by humans	Multi-dimensional human-centric capacity
4.	ADB and Bender & Benson, 2013	Countries, communities, businesses, and individual households	Ability to resist, absorb, recover from, and reorganize in response to natural hazard events without compromising their sustained socio-economic advancement and development
5.	Twigg, J. 2009	System or community, certain core functions, and structures	Ability to anticipate, minimize, and absorb potential stresses or destructive forces through adaptation or resistance manage or maintain certain essential functions and structures during disastrous events and recover or "bounce back" after an event
6.	Cutter et al., 2010	Social system	A system's ability and internal conditions to cope, absorb, respond, and recover from disaster impacts and post-event stresses. This involves adaptive processes that facilitate the ability to reorganize, change, and learn with every response to a threat.
7.	Norris et al., 2008	Community, social system	A process that links a set of adaptive capacities to a positive trajectory of functioning and adaptation after a disturbance

Source: Adapted from Bahadur et al. (2017)

Table 2 Stages and Outcomes of Resilience Capacity

Resilience Capacity	Risk-Orientation	DRRM Phase	Outcome
Absorb and Coping	immediate threats tactical and short-term impacts	During and after impact (response and early recovery)	• Withstand or endure an impact without collapse, • Limit damage from disturbances and maintain functions • Restore essential services
Adaptive	Prospective risks based on past events and projections/ scenarios	Before and after impact (preparedness, prevention, and mitigation)	• Prevent or reduce adverse impacts in the future • Generate lessons from past events, foster learning for adjustments • Adjust current condition for future risk • Increase buffer capacity, redesign functions and structure
Transformative/ Participative Capacities	Prospective risks based on past events and projections/ scenarios		• Enhance people's well-being in the face of present and future risks • Advance progressive change and sustainable development • Foster societal robustness toward managing change in the face of future risks

Source: Adapted from Bene et al. (2012)

Moreover, such processes challenge context-appropriate measurements with a well-structured accountability thread. Two interpretations exist. One refers to liability for sub-optimal performance results, and the other concerns shared responsibility. Liability sits well with performance audits, where normative prescriptions exist for organizational processes. The latter appeals to civic responsibility, where local governments steer and enable a network of other resilience agents (Figure 1).

The slew of administrative guidance on how LGUs manage and reduce disaster risks, often embodied in toolkits and playbooks, helps local governments organize their efforts. However, compliance implies a pre-determined pathway or a prescribed set of actions of a central authority leads to reduced disaster loss or damage–a flawed logic due to the uncertainties of disaster impacts. Moreover, the more subdued view of accountability departs from the risk governance lens, which bids that all resilience stakeholders create a networked system of resources. Hence, accountability is shared. A proposed compromise between these interpretations is to align resilience capacity with the local government operations toward organizational effectiveness. This approach mainstreams risk management elements into existing contractible results of public efforts that communities can benefit from and validate. Furthermore, institutionalizing the inclusion of other resilience actors into the local government response structure leverages shared accountability.

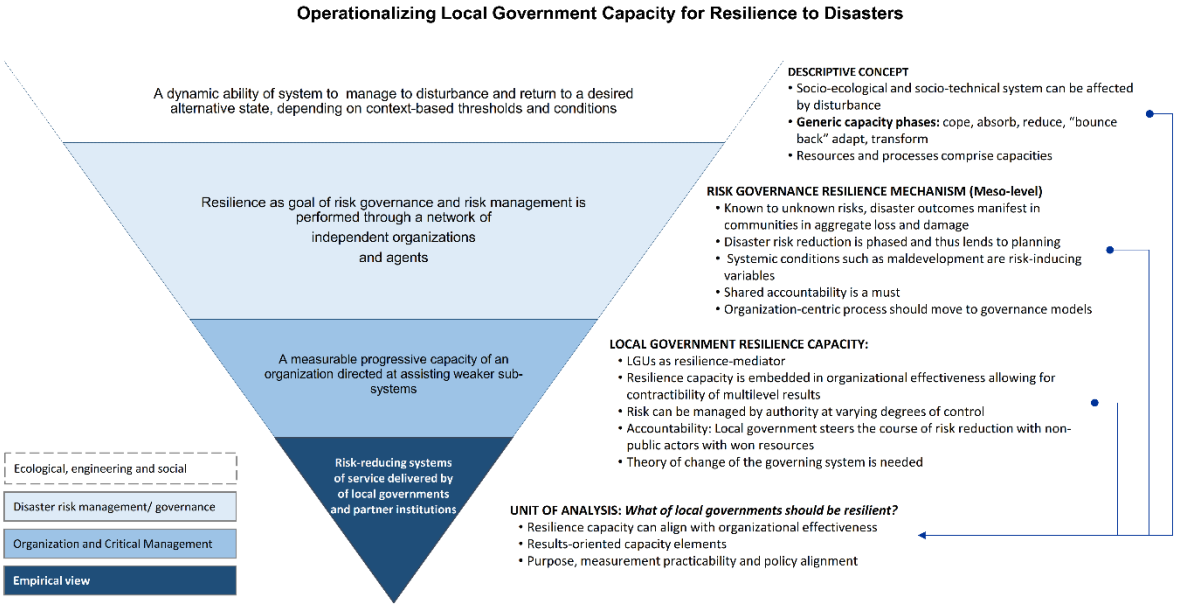

Figure 1 Deconstructing the layers of resilience capacity
Source: Author's construct

4. Measurability of resilience capacity

Although current definitions offer a springboard for capacity assessment, they fall short in guiding the identification of resilience capacity criteria. Consistent measurement mechanisms continue to fuel scientific debates, with most methods wanting empirical evidence (Asadzadeh, Kötter, Salehi, and Birkmann, 2017). Every method proposed is a variant of the resilience concept with multidimensional metrics -- ranging from engineering functionality, human-centered capitals, and place-based processes to institutional attributes. The resulting measures are an amalgam of descriptive specifications of capacity and the prescriptive facets or "what the case ought to be." Thus, methodological differences exist in the essential measurement requisites: the purpose, the scale, and the constitutive elements of resilience capacity (FSIN, 2014; Quinlan et al., 2016; van der Merwe, Biggs, and Preiser, 2018).

4.1 Purpose of assessment

Generally, assessments can be formative or summative, where the utility of results varies (van der Merwe et al., 2018). Summative assessments evaluate the current level of a given performance for external reporting and benchmarking against a set of standardized measures. In contrast, formative assessments assess the process itself to improve performance. Summative studies use outcome-based metrics to evaluate results relevant to a public value, such as well-being, level of service, and loss and damage. In contrast, formative measurement is a systematic and periodic collection and interpretation of current performance evidence to identify areas for improvement in producing intermediate results that support outcomes. When applied to resilience, formative inquiry looks at the attributes of a process, such as critical interactions among institutions, collective decision-making, and innovation (Tucker, 2010). In addition, formative probes often emphasize compliance with policy prescriptions rather than substantial changes in an adverse condition (Frey et al., 2013; Quinlan et al., 2016). As a result, such assessments can potentially erode rather than build resilience.

4.2 Scale of resilience capacity: Network-mediated or organizational resilience?

Measuring resilience to exact accountability in disaster risk management raises the question, "who should be held accountable for what?" Unfortunately, the answer eludes linear logic as there are different assumptions about the scale where capacity sits and how it manifests.

For example, some sector's view capacity from an organizational scale, where a bounded management system defines clear lines of accountability. Another approach is through a network perspective and shared governance of complex risk management work, where accountability is collectively owned rather than allocated among participating stakeholders.

The Sendai Framework promotes disaster risk governance as a critical area that needs strengthening towards resilience, with a specific call on the public sector to steer the course. The UNISDR (2017) asserts that disasters result from inadequate handling of public organizations of pre-existing systemic risks -- wanting prevention and reduction. Huitema et al. (2009), Ikeda and Nagasaka (2011), and Selby and Jiwanji (2016) agree that risk governance first requires shared recognition of risk among system custodians led by public organizations. They further stress the co-management of disaster risk factors through collaborative learning and novel resource management to better help a system buffer and recover from shocks.

Galperin and Wilkinson (2015) likewise share that a common understanding of risk enables system managers to create flexible rules and norms that aid individuals in coping and thriving through a crisis. Galeprin et al. call this adaptive management, a mechanism to create an enabling environment for community resilience. Selby and Jiwanji (2016) extended this premise and suggested a systematic combination of more concrete inputs. These include people (i.e., multiple actors, leadership, organizational capacity, and knowledge), mechanisms (i.e., institutional arrangements, partnerships, coordination networks, and legal and policy framework), and processes (i.e., procedures and products for development such as planning and budgeting).

Despite efforts to operationalize risk governance to imply resilience, some scholars remain cautious, stating "it is still largely idyllic, which outcome has yet to be proven" (Bach et al., 2013; Bristow et al., 2013; Cai et al., 2018; Djalante et al., 2011). Concurring resilience scholars describe risk governance as an "upgraded but nascent version of integrated risk management" or an organization's capacity to anticipate risks and promote multiple stakeholder collaborations (Ikeda & Nagasaka, 2011; Shaw & Maythorne, 2013). Bogardi and Fekete (2018) observed that risk governance remains a common substitute for disaster resilience measures for government agencies. However, too many governance features mute "what needs to be resilient" and muddle the scale of measured capacity elements. They highlighted that all assessments must strive for more scientific rigor to narrow the resilience concept and increase confidence in results and practical utility.

Organizational and management disciplines endorse a more pared-down scope of risk governance that distinguishes the "system that governs" from the "governed system" (Andrew, 2009; Gall et al., 2014; Jung, 2017; Ruiz-Martin et al., 2018). The former refers to organizational structures authorized to act towards a well-defined goal, coordinate critical resources, and mobilize a network of actors to lessen disruptions in more fragile communities. In disaster resilience, communities are "wards" aided by higher systems like local government units. The critical resource consists of service networks (Figure 2) under local governments' direct supervision or substantial influence, such as infrastructure, supply chain, and businesses (Kahan et al., 2009; Ruiz-Martin et al., 2018). However, this does not mean the demarcation among these system agents and social groups is absolute and hierarchical. Andrew (2009) suggests establishing inter-jurisdictional agreements among local governments and systems agents to formalize unique relations and manifest contractual ties crucial for regional integration and broader resilience actions. While these agreements may overlap with multiple activities and specialized agencies, these can also foster a culture of reciprocity among the organizations.

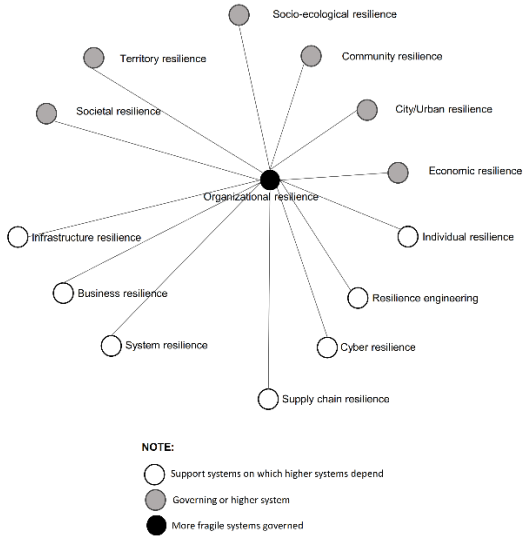

Figure 2 Relations between resilience concepts and organizational resilience
Source: Ruiz-Martin et al., 2018

4.3 Performance measurement and local accountability

The widespread attempts to attribute loss and damage as resilience outcomes to local risk management bring a deluge of capacity elements to assess. However, the measurement approach is far from straightforward because these elements are held in and produced through social interactions, even at an organizational scale. Bogardi et al. (2018) stress that the ebb and surge of organizational responses to risks and disasters often consist of overlapping actions that blur the synthetic divide among operational actors in an imprecise interaction space. Accordingly, the ambiguity between risk reduction and management phases fueled the diversity of capacity elements to be measured.

Recent assessment tools focus on changes in enabling conditions such as municipal planning processes, business environment, the extent of public services delivered, and regulatory mechanisms to approximate accountability and local government-mediated resilience (Bozza, Asprone, and Manfredi, 2015).

These initiatives essentially square local government's resilience capacity with organizational performance, which underlies its missions and subjects its internal and external goals to formative and summative assessment. As such, efforts and results align with organizational effectiveness because they are problem-driven rather than theory-driven constructs (Sudnickas, 2016; Henri, 2004).

Longstaff, Armstrong, Perrin, May, and Hidek (2010) propose to limit the scope of the organizational performance of disaster management organizations to resilience-building processes associated with the robustness of resources accessible to them. They define resources as "objects, conditions, characteristics, and energies that people value in different ways across geographic scales, cultures, and hazard contexts (Longstaff et al., 2010). These include shelters, hospitals, lifeline utilities like water supply, or facilities that promote social cohesion and economic wealth. Other tools consider leadership, information, and technical competencies as organizational resources.

All these resources can support logic-based measurements that assess a sequence of observable attributes, actions, conditions, and outcomes that lend to empirical testing (FSIN, 2014). This observation is consistent with results-based monitoring and evaluation and organizational performance measurement – a practice common to the private sector and recently adopted in public sector organizations.

Diefenbach (2009) defines performance measurement as the "systematic, regular, and comprehensive monitoring and assessment of vital aspects of organizational performance based on explicit targets, standards, indicators, and measurement and control systems." It appraises the status of performance and tracks change over time to complement more in-depth assessments. However, performance measurements cannot demonstrate attribution (Seville, 2009) of outcomes to specific interventions. At best, empirical evidence from performance measurement generally supports improved overall organizational productivity in the private sector. Dieffenbach (2009) explains that, unlike private organizations, public entities like local governments have multifaceted goals directed at different public needs, resulting in elaborate service delivery processes. The most significant challenge for performance measurement in public organizations is the integration of various aspects of organizational performance, often measured with incomparable indicators (Balabonienė and Večerskienė, 2015; Speklé and Verbeeten, 2009; Sudnickas, 2016). This situation applies to measuring disaster risk governance, where local authorities manage densely networked institutions with diverse responsibilities that span multiple jurisdictional scales within and beyond administrative territory. Process-oriented assessments thus become too complicated and fuzzy and less preferred over output or outcome-based measurements (Frey et al., 2013; Henri, 2004; Summermatter and Siegel, 2008).

Organizational outputs are quantifiable results tied to service delivery efficiency and quality. Goals are specific, and performance measures tailback an organization's objectives and targets. Organizational actors know and control the processes, transforming efforts into definitive results (Speklé and Verbeeten, 2009). Conversely, outcomes pertain to the benefits that clients derive from organizational outputs but with much more control. Marchant and Stevens (2017) contend that outcome-focused assessments decrease overall performance when metrics that drive incentive and sanction are challenging to specify. Different actors within and outside the organization share accountability. Such is the institutional setting for local disaster risk reduction. The more avenues for procedural and substantive resilience-building actions exist, the weaker the attribution of outcomes to risk governance. Outcomes can be contractible in public sector organizations when the desired risk governance results are sufficiently defined beforehand in clear and enforceable terms and processes. However, public organizations' complex risk management actions change over time with every occurrence of an impact (Kirschenbaum, 2004; Patterson, Voogt, and Sapiains, 2019).

As human service organizations, local governments define their goals within the purview of their autonomy. Two (2) motivations usually emerge from their activities that outline their performance areas. The first is improving service efficiency (delivery-oriented) through inputs and processes such as budget utilization, staff competency, and functionality of internal operating structures. The other goal concerns the effect of work systems on community safety and well-being (constituency-oriented). Life-saving and recovery-facilitating measures include shelters, emergency alert systems, rescue and relief operations, and subsidies.

Delivery- and constituency-oriented actions give local disaster risk governance a verifiable form, provided these can logically demonstrate priorities and the intended change that involves multiple actors. Hence, local resilience capacity can evolve into contractible and measurable organizational performance results.

Ruiz-Martin et al. (2018) define organizational resilience as the measurable combination of characteristics and capability of an organization to maintain critical operations in the face of known and unknown disturbances. They add that organizations recover from shocks by assuming the costs of coordinating their essential functions. They also draw upon other service institutions to maintain stability and provide weaker organizations with resources, templates, and structures to prevent a complete institutional collapse.

Jung (2017) agrees and describes such organizations as production systems and enabling structures guided by performance scripts to reduce the complexity and uncertainty of the environment, but adds two critical points needing clarification: (a) the locus and centrality of decision-making for resilience and (b) the quality of risk management processes.

Perhaps this scale suits local governments as they perform distinct and more complex roles than households or private organizations. Depending on the tier they operate in and the authority over risk management, the operational space of local governments for disaster risk management can overlap or rely on other administrative units. Lacambra et al. (2015) and Chandler (2014) describe these institutional limits as a "social character of risk," which argues that disruptions in society from natural hazards result from some governance failure. The situation occurs when institutional decision-making processes inadvertently create barriers to valuable learning from risks and impacts, including unintended policy outcomes. Therefore, local governments can reduce systemic risks by partnering with non-public actors to resolve maldevelopment issues that amplify disaster risks to vulnerable populations and assets.

5. A proposed concept of disaster resilience at the local government level

Disaster risk reduction significantly recognizes uncertainties about how natural hazards can evolve into security threats relative to changing capacities to respond and recover. This view tempers conventional assumptions on the linearity between disaster risk management capacity and outcomes. While definitions of disaster resilience vary, all assume some systemic weakness or vulnerability that makes a social system susceptible to adverse impacts on well-being and security. The emphasis on capacities directed at systemic conditions that tend to give rise to risks acknowledges that what reduces vulnerability increases resilience. However, the credence of risk-reducing strategies diminishes when resilience assessments fall short of policy expectations. As Cutter (2014) succinctly sums up, the conceptual tensions on resilience are not an issue per se, but the disparate assumptions and approaches to operationalize the construct make assessments contentious.

This paper proposes a synthesized concept of local government resilience capacity as a starting attribute or end-point condition referenced to the timing of the disturbance and the extent of inherent system vulnerabilities (Figure 3a). It locates resilience capacity in formal organizations (i.e., LGUs) that enable communities to mitigate risks and recover from impacts. Their risk governance strategies that mediate community disaster preparedness contain measurable features, albeit indicative. Such a view underscores the contractibility of these measures due to local governments' control over resources to achieve resilience goals. Control manifests in an organization's internal choices regarding the tractable resources and capabilities to improve operational efficiency or produce societal benefits. With risk governance as the demonstration of resilience capacity, local governments can influence other disaster management actors and institutions to help ensure risk reduction outcomes. An organization adopting risk governance better supports weaker social systems (i.e., settlements exposed to risks).

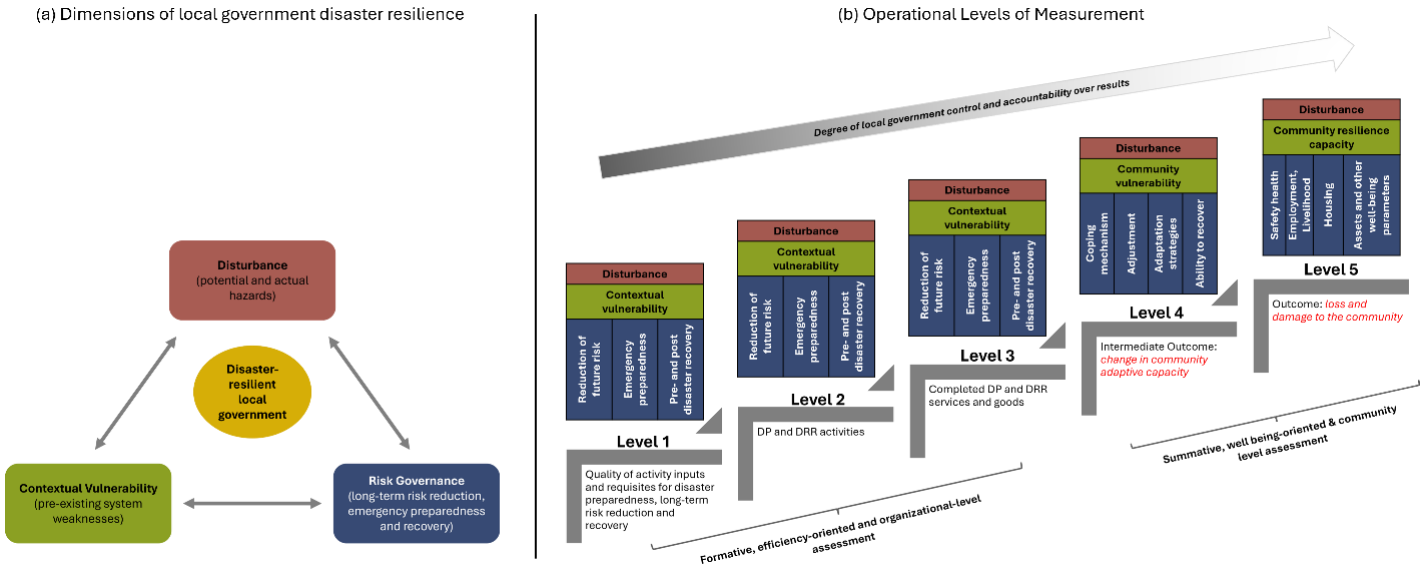

Figure 3 Proposed dimensions of local government resilience and phase of results-based measurement
Source: Author's construct

Further, the decision center shifts from a unitary entity to a network of risk management agents. As a result, one expects a more comprehensive and integrated approach to reducing pre-event and residual risks that also allows for accountability tracking. However, local government control is likely more robust on results involving its administrative reach than outcomes that manifest at the community level.

The assessment framework for local governments should then depict a more straightforward pathway of change from the efficiency of service delivery to boosting the adaptive capacity of its constituencies. It needs to demarcate the local government as the governing system and the community at risk as the governed system. Local governments' risk-reducing services can then be the subject of periodic reviews of efficiency-related objectives to be attained over time. For instance, Level One can focus on the quality of inputs to resilience-building strategies. Level Two assessment would zero in on the progress of these interventions. Level three can track the completion of risk reduction services and program outputs. Impact assessments can follow in Levels 4 and 5 to verify how local government resilience contributed to community safety and well-being (Figure 3b). These tiers can serve as appraisal cycles with progressive performance targets or benchmarks that LGUs should satisfy.

Finally, metrics for each resilience capacity dimension should be time-sensitive. It may involve periodically modifying these parameters with stakeholders and LGUs as hazardscapes, local context, and capacity interact dynamically.

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Chronological Analysis of Bank Branch Operating Environment Factors: The Case of the Ortigas Central Business District, Metro Manila, Philippines

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Abstract

The global effort to ensure financial products and services are accessible to populations in unserved and underserved regions has posed inherent difficulties for banks and financial institutions. This challenge arises from inadequate information about suitable locations for establishing physical branch office operations that are both viable and sustainable. Focusing on the Ortigas commercial business district (CBD) in Metro Manila, Philippines, as the case study area, the key operating environment factors, particularly the presence of anchor institutions, land use commercial potential, and fully developed road network, were identified through the key informant interviews. A chronological analysis spanning different periods was conducted to examine and confirm the influence of the mentioned factors on the entry, expansion, and concentration of bank branches in the CBD. Additionally, the study explored the contribution of central bank policies, specifically liberalization measures, to location-specific restrictions regarding branch expansion in key cities within Metro Manila. The findings highlight the significance of these location-decision factors and policy interventions in informing the planning of financial districts at the local government unit level, irrespective of their financial inclusion status. Furthermore, the research elucidates the interconnections between these operating environment factors and their role in shaping the urban form of the CBD. The influx of anchor institutions or customers, driven by these factors, serves as primary sources of branch deposits, underscoring the importance of strategic planning and policy framework development in promoting financial inclusion and urban development.

Keywords: bank branches, bank branch location, chronological analysis, commercial business districts, financial inclusion

1. Introduction

1.1 Background and Rationale

At the turn of the 21st century, the spatial distribution of bank branches has received increased attention among central banks in the global pursuit of financial inclusion. In 2006, the United Nations (UN) led this drive by establishing the advisory group on inclusive financial sectors to advise the UN system and member states on global issues related to inclusive finance (BSP, 2015). Since then, various initiatives have been implemented to foster financial inclusion, with the primary focus on ensuring that financial services are easily accessible to the population, especially in underserved and unserved areas.

Recognizing the crucial presence of banks for economic expansion, the Bangko Sentral ng Pilipinas (BSP) implemented the National Strategy on Financial Inclusion (NSFI) in July 2015. It aims to ensure an accessible financial system responsive to the needs of the flourishing and financially viable population.

The reports from the BSP showed that the number of bank branches has been consistently rising since 2011, reaching a total of 12,316 banking offices nationwide by the end of 2018. While the physical branch network of banks continues to experience sustained growth, regional disparities persist due to the natural and economic tendencies of bank branches to concentrate in highly urbanized regions like Metro Manila (BSP, 2015).

The liberalization policy implemented by the BSP in 2012 and 2018 contributed to the uneven regional distribution of banks. It allowed banks to set up branches at their preferred locations within the previously restricted cities in Metro Manila, namely, Makati, Mandaluyong, Manila, Parañaque, Pasay, Pasig, Quezon City, and San Juan (BSP, 2016a). This bank branch liberalization carried out by the BSP is hinged on the following agenda: (1) promote competition and efficiency in the banking sector; (2) increase financial access and inclusion by expanding banking services to underserved areas within the metropolitan districts; and (3) stimulate economic growth by facilitating greater access to financial services for businesses, institutions, and individual customers. The implementation of the liberalization agenda was without specifications about the operating environment factors that are essential for banking institutions to plan their location and contribute to financial inclusion effectively.

Although previous research has explored various aspects on branch location, such as financial efficiency indicators (Min, 1989; Abassi, 2003; Cinar, 2009), spatial analysis (Ansong, D. *et al.* 2015), herding behavior (Chang, A. *et al.* 1997), and location-allocation modeling (Ahmad, N. *et al.* 2016), chronological examination seems not evident in terms of the operating environment factors that could explain the motivations of banks in locating within metropolitan CBDs. The operating environment factors refer to the surrounding spatial environment settings or features including the BSP policy measures on liberalization that contributed to the entry of bank branches in the CBDs.

In this paper, the surrounding spatial environment landscape relates to the following operating factors within and around the vicinity of the CBD: (1) land use commercial potential prevailing during a particular period; (2) fully developed road network that eases customers' access; and the (3) presence of anchor institutions or major customers of products and services offered at the branch.

The selection of the operating environment factors was based on related studies. It was further motivated by the availability of verifiable records/data from the public domain, access to archives of photos and maps, information from individuals involved in the planning and development of the CBD, and information from individuals who lived, stayed or worked through various periods in the CBD.

The other factors discussed in the literature that are not descriptive of the surrounding environment were excluded. Several of these factors are found in the comprehensive study by Başar *et al.* (2014), which focused on customer service preferences, socio-demographic characteristics, proximity to competitors, or local economic indicators (i.e., employment, home ownership, and income levels).

Generally, the paper examined the evolution of bank branch entry and growth in one of the major CBDs of Metro Manila in the Philippines. Specifically, it intended to explore and describe the surrounding environment and regulatory policy decision factors that led to the entry of bank branches and their concentration behavior (i.e., increasing presence within the study area across different periods) across time in an urban setting. The study also recommends location factors that can be considered in land use planning and establishing an operating environment for a financial district.

1.2 Significance of the Study

The research provides a factual basis and significant inputs for planning financial districts at the local level. The operating environment factors generated from the analysis of bank branch entry and concentration in the CBD are potential decision factors that can be considered by the central banks, urban planners and professionals, and the local government units (LGUs) in planning financial districts.

This research also sheds light on the spatial dynamics and regulatory influences driving the growth of bank branches in urban centers. By examining these factors alongside the evolution of bank branches, the study can offer insights into and input to identifying land use planning strategies and establishing an optimal operating environment within a financial district. Ultimately, the findings of this research can inform policymakers, urban planners, other professionals, and financial institutions about promoting sustainable urban development and financial inclusion.

2. Review of Related Literature

2.1 Regulatory and Operating Definition of a Bank Branch

The BSP refers to a branch as "any permanent office or place of business in the Philippines other than the head office where a bank may perform activities and provide products and services that are within the scope of its authority and relevant licenses." Universally recognized as branches, bank branch offices are vital in servicing individuals, entities, and the economy's daily deposit and withdrawal requirements (including bills payment). The other services that bank branches perform include issuing checks, storing excess money in the region, and back-office accounting. These cannot be done through online platforms based on risk management and accounting rules and regulations.

In any country, the central bank regulates banks or financial institutions, including the business segment for branch banking operations.
In the Philippines, the local practice among banks in establishing a bank branch office is generally governed either through leasing of space, owning a building, or acting as a bank agent through entities with existing facilities for the collection of cash deposits, remittances, and facilitating withdrawals.

With respect to spatial distribution, a bank is usually organized with a central or head office and its network of field offices. The head office of a bank provides back-end support and the overall management of field office operations in the areas of human resources management, enterprise-level finance and accounting, legal services, corporate affairs, information and technology, lending support, product and programs development, strategic directions, investment banking, among other things that the central bank would allow.

2.2 Capitalization Requirements for Bank Branch Entry and Expansion within Metro Manila

According to the General Banking Law (Republic Act No. 8791), banks are "entities engaged in the lending of funds obtained in the form of deposits." They are generally classified as universal, commercial, thrift, rural, cooperative, Islamic, and other classifications by the Monetary Board (BSP, 2000b).

The implementation of the law grouped the banks into three broad tiers and authorized the expansion of their branch network based on specific capitalization levels (BSP, 2014). Tier 1 comprises universal banks (UBs) and commercial banks (KBs) with the largest assets. Banks falling under Tier 1, with over 100 branches, including their head office, are mandated to maintain a capital of 20 billion pesos for UBs and 15 billion pesos for KBs.

Tier 2 consists of thrift banks (TBs), including savings and mortgage banks, private development banks, stock savings and loan associations, and microfinance thrift banks with medium-sized assets. TBs with branch networks exceeding 50 branches, including their head office in Metro Manila, must maintain a minimum capital of 2 billion pesos.

Tier 3 comprises relatively less-capitalized financial institutions, such as rural banks (RBs) and cooperative banks (CBs), predominantly in rural areas. These banks are crucial in promoting and expanding the rural economy by providing essential financial services to rural communities. RBs and CBs often serve as channels for UBs to support farmers and fisherfolks throughout the production process by offering loans for inputs and irrigation to intensify production.

The minimum capitalization required for Tier 3 banks (RBs and CBs) operating within Metro Manila with up to 10 branches is 75 million pesos, while it is 30 million pesos for all cities up to third-class municipalities and 15 million pesos for municipalities categorized as fourth to sixth income class. Despite the substantial capitalization requirements, the factors driving the entry and concentration behavior of Tier 1 and Tier 2 bank branches in Metro Manila remain largely unexplored.

2.3 Drivers of Spatial Concentration of Bank Branches in CBDs

The neo-classical theory on agglomeration economies, espoused by Smith, *Ed. Soares* (2007) and Marshall (1920) demonstrates that large, medium, and small-sized financial service firms are inclined to cluster in CBDs within metropolitan regions.

These are attributed to the need to access large pools of specialist labor and support services (e.g., accounting, actuarial, legal, security, insurance, brokerage houses, among others.), to be near their core markets, and to develop and innovate intrinsic skills through the sharing of knowledge and practice (Andersen, 2000).

Pandit & Cook (2003) characterized financial service firms that are strongly clustered or concentrated to exhibit faster growth with respect to the average concentration…thus "benefitting from the attraction of a disproportionate volume of new firm entry."

In the study of Chang et al. (1997) in New York City and other metropolitan areas, bank branches follow a herding behavior or tend to be spatially concentrated. Rational herding becomes apparent where agents/firms mirror the behavior of others to generate rationale and aggregate efficient outcomes, individually and socially.

Several economic activities exhibit rational herding, where retail stores exemplify the same clustering or concentrated behavior. As Isard (1956) described, herd behavior in certain areas is a factor in the location decisions of bank branches alongside theoretical characteristics of localization economies. Porter (1998) described this concentration based on his "economic cluster theory" concept, which emphasizes the availability of complementary resources, specialized suppliers, and skilled workforce within a geographic area.

Furthermore, the theory emphasizes the importance of anchor customers, which are large, influential companies that attract and support a network of related businesses within the same geographic space. These anchor customers drive economic activity and foster innovation within the cluster.

CBDs can be viewed as physical manifestations of an economic cluster, as they often represent concentrations of businesses that are similar, related, or complementary in nature. Rosenfeld's (1997) definition of a cluster as a "geography-bounded concentration" aligns with the spatial concentration of bank branches and anchor customers or institutions typically found in CBDs.

Within CBDs, businesses often share specialized infrastructure, such as office buildings, transportation networks, and communication systems.

Additionally, CBDs serve as hubs for labor markets and services, providing a centralized location for businesses to access skilled workers, private and government institutions, and support services.

Moreover, CBDs facilitate active channels for business transactions, communications, and dialogue among firms operating within the district. This interaction fosters collaboration, knowledge sharing, and innovation, all of which are characteristic elements of clusters as defined by Rosenfeld (1997). Furthermore, businesses within CBDs face common opportunities and threats, such as changes in market demand, regulatory policies, and competitive pressures.

Table 1 summarizes the factors contributing to the geographical concentration of branches in CBDs based on firm location theories established by several economists.

Table 1 Factors that Contribute to Geographical Concentration of Bank Branches in a CBD

Firm Location Theories/Concepts	Proponents/Sources	Factors Contributing to Geographical Clustering of Industry/Workers
Agglomeration of Firms in Space	Smith, *Ed. Soares* (2007) and Marshall (1920)	• Specialization, knowledge sharing, and sharing of intermediate suppliers • Benefits are more significant than the added costs of rent, wages, and transportation • A complex process involving agglomeration (or centripetal) forces and dispersion (or centrifugal) forces.
External Economies	Isard (1956)	• *Localization* economies or gains from proximity to *similar* firms, especially firms in the *same* industry • *Urbanization* economies or gains from proximity to *dissimilar* firms, especially in *other* industries.
Locational Interdependence	Hotelling (1929)	• Market space with uniform production cost, uniform product selection, and uniform demand, firms of like products to situate next to each other to maximize profits.
Concentration Inside and Outside the Centers	Giuliano et al. (2019)	• Different types of industry participants were more concentrated *inside* centers than outside centers, and the degree of clustering was *higher* for the larger, relatively dense centers. • Interactions of centers were enhanced by the presence of a higher regional transport network which was supportive of specialized services, i.e., education, information/media, public health, and business (financial, retail, professional), all of which were undertaken by service centers.
Evolution of Cluster Patterns	Krugman (1992), Brown (2000), Yamawaki (2002), and Basant (2006)	• Firm-level decisions leading to the evolution of cluster patterns were attributed to variables such as technology transfer, chance factor, availability of input supplies, and historical circumstances (Krugman, 1992); conducive government policies (Brown, 2000); the existence of related industry cluster, presence of supporting industries like research and development institutions or universities, and favorable infrastructure (Yamawaki, 2002), and availability of human capital (Basant, 2006).
Technological Progress	Gaspar and Glaeser (1998)	• Innovative activities by firms led to technological progress, advancing agglomeration and clustering in already developed areas. • An increase in business *trips* occurred despite the improvements in telecommunications technologies. • Telecommunications became *complementary to*, rather than substitute for, face-to-face meetings, and cities function as information centers.

2.4 Empirical Factors Related to Bank Branch Operating Environment

Various empirical studies (Table 2) associate entry and concentration of financial services firms with one or a combination of the following location criteria: (1) presence of customer demand (population, household size, number of firms or potential customers); 2) presence of competitor branches; 3) socio-demographic factors (demographic characteristics, state of employment, home ownership rate); 4) cultural norms related to financial habits; 5) local economic circumstances (income levels, deposit amounts, and commercial viability); 6) ease of access of travel through a fully developed transport network; and 7) the commercial potential within the current land use.

The synthesis of these studies confirms that the land use commercial potential, fully developed road network accessibility, and dependable/core customer demand appear to be the most important spatial features of a branch operating environment from the perspective or preference of bank management.

Table 2 Location Criteria for Banks

Criteria	Sources
Population and population growth rate	Clawson, 1974; Olsen and Lord, 1979; Doyle *et al.* 1981; Meidan, 1983; Boufounou, 1995; Abassi, 2003; Zhao *et al*. 2004; Cinar, 2009
Average per capita domestic income	Clawson, 1974; Boufounou, 1995; Cinar, 2009
Home ownership rate	Clawson, 1974; Olsen and Lord, 1979;
Commercial potential	Meidan, 1983; Cinar, 2009
Location of competitive branches	Doyle *et al*. 1981; Meidan, 1983; Boufounou, 1995; Abassi, 2003; Zhao *et al*. 2004; Cinar, 2009
State of employment	Olsen and Lord, 1979; Doyle *et al*. 1981; Meidan, 1983; Zhao *et al*. 2004; Cinar, 2009
Demographic characteristics	Olsen and Lord, 1979; Doyle *et al*. 1981; Min 1989; Kaufman and Mote, 1994; Ravallion and Woodon, 2000; Rahgan and Mirzazadeh, 2012
Ease of access	Doyle *et al*. 1981; Min 1989; Zhao *et al*. 2004; Rahgan and Mirzazadeh, 2012
Business operations	Min, 1989
Average household size	Boufounou 1995; Cinar 2009
Number of firms or potential customers	Doyle *et al*. 1981; Boufounou, 1995; Abassi, 2003; Zhao *et al*. 2004; Cinar, 2009
Income levels	Abassi, 2003; Zhao *et al*. 2004
Total deposits	Abassi, 2003
Cultural characteristics	Abassi, 2003
Literacy rate	Cinar, 2009
Deposit credit per bank branch person	Cinar, 2009

Source: Başar *et al*. (2014)

2.5 Chronology of Bank Branching Restrictions and Liberalization in Metro Manila

In the Philippine context, research on location factors that stimulate the entry of branches is very few. Existing literature on bank and branch entry has focused largely on policy-based studies. These academic works are directed toward competition, encouraging the formation of bigger banks, and considering past economic and political events that affected corporate-level efficiency.

The scholarly investigations concerning Philippine banking and branch establishment have focused on several key themes. These include inquiries into competition and efficiency (Hapitan, 2012; Dacanay, 2010), analyses of financial liberalization (Milo, 2001), and examinations of the moratorium on branch expansion, crisis, consolidation, profit efficiency, and cost inefficiency (Lamberte & Manlagnit, 2004). While bank firms are allowed to decide and select location for their new branches, the overarching route of approval reveals a highly regulated environment. This is evident from several general liberalization policies issued by the BSP beginning 1993 until August 1999.

Stringent entry requirements exogenous to the firms were imposed. This ensures that only potentially viable banks will be granted permission (BSP, 1994; BSP, 1998a; BSP, 1998b; BSP, 1998c).

The phased lifting of branching restriction in eight (8) “restricted areas” of Metro Manila started in June 2011 based on the BSP Monetary Board Resolution No. 789 (BSP, 2011). The two-phased liberalization approach in the cities of Makati, Mandaluyong, Manila, Parañaque, Pasay, Pasig, Quezon, and San Juan were meant to foster a competitive market environment aimed at enhancing the quality and efficiency of financial services delivery, emphasized in the BSP Circular 759 (BSP, 2012).

In line with these approvals, private domestically incorporated universal and commercial banks (Tier 1 U/KBs) and thrift banks (Tier 2 TBs) that had less than 200 branches in the "restricted areas" as of December 2010 were allowed to apply for new branches in the restricted areas under Phase 1 which ended in June 2014. This development has set into motion the importance of matching the cap (limit) in the number of branches with the bank’s financial capital.

Phase 2 took effect on 01 January 2018, which entirely lifted the moratorium on establishing new domestic banks and locational restrictions. The BSP allowed bank firms to establish as many branches as their minimum capital requirements could support.

3. Conceptual Framework

The structure and content of this chapter can be encapsulated by highlighting the methodological gap in analyzing bank branch entry and their concentration in CBDs, as well as the synthesis of the literature review. The decision-making process regarding the location of financial service facilities is typically discretionary for banks and firms, conforming to BSP regulations and various theories on firm location from the literature.

Firm location theories suggest market players, such as services and retail firms, are drawn to "city-center" or "business district" areas due to market-related motivations, firm behavior, agglomeration economies, and locational interdependence. These factors explain the tendency of firms to cluster near each other and concentrate on CBDs.

However, the operating environment factors in CBDs, particularly in terms of the surrounding spatial features, have received less attention from studies on bank branch location.

The conceptual framework for the research (Figure 1) identifies three (3) equally significant spatial features of the operating environment crucial to establishing bank branches, specifically: land use commercial potential, presence of anchor institutions, and a fully developed road network. Additionally, the framework incorporates the policy on branch liberalization as a regulatory factor exercised by the central bank to authorize the expansion of bank branches in key cities of Metro Manila as a metropolitan center. Each feature is informed by factors from empirical studies involving bank firm-level location decisions.

The conceptual framework illustrates the logical progression of the researcher's insights regarding the relationship between these key operating environment decision factors and their respective implications for planning financial districts.

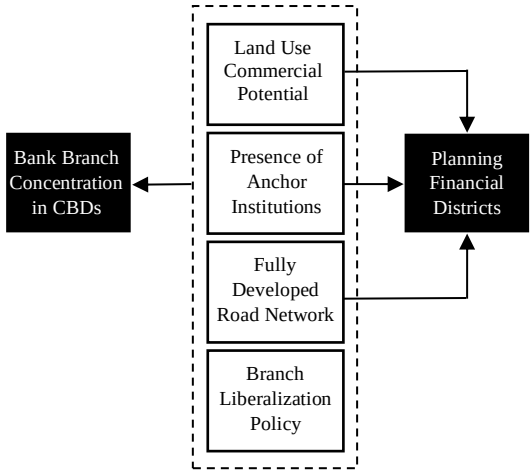

Figure 1 Conceptual Framework

Source: Authors' construct

4. Approach and Methodology

Based on the conceptual framework of the study, the research design was methodically structured to encompass both descriptive and exploratory methodologies. The descriptive phase focused on identifying key operating environment decision factors through interviews with senior bank executives representing the majority of the top 10 financial institutions in the Philippines, particularly those with significant deposit volumes.

The exploratory aspect of the research primarily entailed documenting and validating the key decision factors pertaining to the operating environment as identified by bank management representatives. This documentation process involved conducting a chronological analysis of the decision factors.

Chronological analysis addresses the methodological gap that mapping and other visualization techniques could not account for because the concentration pattern of branches take time to be discovered or realized (Anselin *et. al*, 2007). Past studies using Geographic Information Systems (GIS) supported this claim by emphasizing the need for a prior understanding of location factors as input attributes in exploratory spatial data analysis. Through a chronological analysis, the entry and concentration of branches in the CBD can be explained alongside the operating environment that supported their location in the economic space.

Subsequently, validation was achieved through separate interviews with individuals possessing relevant expertise, including a former head of the government's public works department, a former chief operating officer of the estate management firm in charge of the study area masterplan, and private individuals who have resided or worked within the study area during different periods.

Historical archives containing photographs and related information from the public domain were utilized to complement the interview data. These archival materials provided visual context and enhanced the triangulation of information obtained from the key informant interviews (KII).

4.1 The Study Area

Metro Manila is the capital region of the Philippines, which has a homogenous urban condition and a clear visualization of the spatial concentration of branch banking. It contributes 30 percent to branch offices which constitute 67 percent or 8.5 trillion pesos in total cash deposits of the entire Philippine banking system (PDIC, 2018). Thus, the region is an appropriate case study area representing branch concentration.

Narrowing down Metro Manila as the universal research locale, the spatial frame focused on the "Hacienda de Mandaloyon" Estate where the Ortigas CBD is located and selected as the micro unit of analysis. Situated within Metro Manila, the Mandaloyon estate is bounded by the Diliman Creek to the north, the Pasig River to the south encompassing much of Mandaluyong City and parts of Pasig City, the Marikina River to the east, and the San Juan River to the west (Figure 2).

In January 1920, Dr. Frank W. Dudley and Don Francisco Ortigas acquired approximately 4,033 hectares of land known as the "Hacienda de Mandaloyon" from the Augustinian order friars. The intention behind this acquisition was to develop the area into both a commercial and residential zone. Subsequently, ownership of the land transitioned from Dr. Dudley to Phil C. Whitaker, who eventually sold his shares to Ortigas, Madrigal y Cia, S. en C. (a limited partnership by shares).

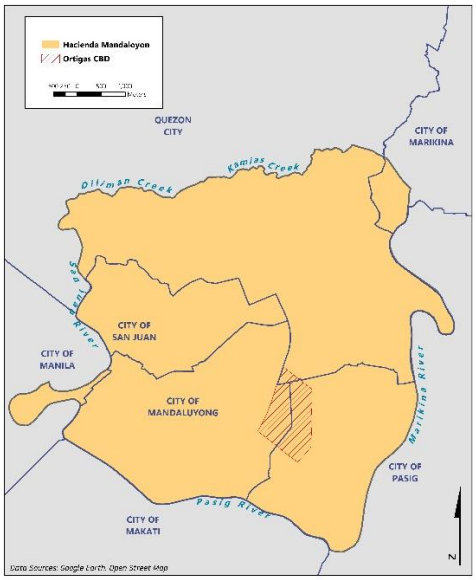

Figure 2 Hacienda de Mandaloyon Estate

Source: Authors' Construct

The research focuses on the Ortigas CBD and its fringe area. The CBD covers the segment of the Mandaloyon estate delimited by Epifanio delos Santos Avenue (EDSA) to the west, Ortigas Avenue to the north, Manila Electric Rail and Light Company (MERALCO) Avenue to the east, and Shaw Boulevard to the south (Figure 3). The fringe area refers to the surrounding land area based on a 2-kilometer buffer reckoned around the CBD periphery.

Figure 3 Ortigas CBD Vicinity Map

Source: Asian Development Bank (2013)

The selection of Ortigas CBD and the surrounding fringe was predicated upon several factors, specifically: (a) abundance of historical data regarding land use transformation, which could be corroborated through KII, as well as through published and publicly available resources; and (b) the site is characterized as a meticulously planned area and served as a pivotal district for various financial, institutional, and economic activities. This inherent attractiveness of the identified unit of analysis is appropriate for establishing the decision factors motivating bank branch entry, expansion, and concentration.

4.2 Collection of Evidence and Descriptive Analysis of Branch Operating Environment Factors

The collection of descriptive information primarily focused on identifying factors related to the operating environment that influence banking decisions regarding the location of branches in the CBDs. This data collection process involved conducting interviews with senior-level management who are responsible for or have been involved in branch banking decisions. Specifically, the interviews were conducted with representatives from Tier 1 and Tier 2 Philippine banks, which are mainly from the top 10 banks in terms of deposit volume.

This non-probabilistic purposive approach was employed to ensure that the selected banking institutions would provide a representative sample of industry behavior, given their significant presence in the spatial distribution of branches in major CBDs within Metro Manila. In addition to seeking expertise in branch banking operations and/or involvement in branch policy decisions, the bank experts' track records and brief profiles were also considered for this study (Table 3).

Table 3 Profile of Bank Management Level Interview

Name of Bank a/	Industry Rank on Deposits	Management Representative Position	Years in Banking
A	1	Department Manager	>20
B	2	Senior Vice President	>20
C	3	Department Manager	20
D	4	Asst. Department Manager	15
E	7	Senior Vice President	>20
F	8	Senior Vice President	15
G	10	Executive Vice President	15
H	12	First Vice President	>20
I	45	Asst. Vice President	5
J	Not Ranked	Senior Vice President	>20

a/ Code applied to maintain confidentiality of the institutions

During the interviews, decision-makers provided insights into internally established guidelines and unique mandates issued by the bank's board of directors or regulatory authorities pertaining to branch entry and expansion. These discussions helped clarify the decision-making process within the banks.

Subsequently, the identified location factors were ranked by the bank experts based on their perceived relative importance, using the Multi-Attribute Utility Technique (MAUT) Pairwise method. This ranking facilitated the visualization, isolation, and establishment of the relative significance of the operating environment factors, specifically: (1) land use commercial potential, (2) presence of anchor institutions, and (3) fully developed road network.

4.3 Exploratory Approach and Chronological Analysis of Operating Environment Factors and Branch Entry in the CBD

The investigation of the key operating environment factors for bank branches involved a comprehensive profiling of the study area, tracing its development from its acquisition and establishment in the 1930s to the year 2019. This exploratory approach also documented the proliferation of bank branches over the study period. The research utilized publicly available information from online platforms and social media communities comprising individuals with expertise in history, cultural anthropology, urban planning, banking industry, and human society to gather relevant data.

The diverse perspectives of professionals and experts were instrumental in assessing the conditions in the CBD and the operating environment of bank branches. The chronological analysis as a methodology facilitated the validation and elucidation of the following operating environment factors for bank branches in each time period or era:

a) *Factor 1: Land use commercial potential*. Information was acquired through interview of the Chief Operating Executive of the CBD land holding. Additionally, vintage photographs from the official website of the Ortigas estate founder, report archives of the American chamber of commerce in the Philippines, the Philippine Supreme Court jurisprudence, and other public domain platforms pertaining to the estate's history including the Ortigas Foundation Library, were utilized. These sources provided valuable insights into the historical transformation of land use, complementing the information from LGU records.

In recent years, an analysis of the prevailing official zoning map from the LGU's comprehensive land use plans was conducted. This information and details about commercial features in the CBD were cross-referenced and visualized using open-source software and websites such as Google Open Street Map and Google Earth. This approach enabled the researchers to verify the current status of the operating environment and validate the discussions regarding the CBD's land use commercial potential.

The analysis considered factors such as the land use types based on the functional areas indicative of commercial activities that support branch banking services.

b) *Factor 2: Presence of anchor institution*. Information from various sources, including disclosures on the social media page of the Ortigas Foundation Library and other public domain platforms were carefully reviewed and cross-referenced with the results of the KII. Additionally, actual site visits and observations were conducted to validate information from the public domain regarding the composition of anchor institutions established in the 1990s.

The anchor institutions crucial to bank branches include government and major private offices, shopping malls, mixed-use high-rise buildings, and essential facilities such as hospitals, schools, and churches. These institutions are considered significant in the banking industry due to their high demand for physical branch facilities to cater to their substantial volume of daily cash transactions. This demand is crucial in sustaining the viability of branches within the CBD.

c) *Factor 3: Fully developed road network access.* The information on significant changes in the physical landscape related to road infrastructure enhancements was primarily obtained through KIIs. The findings from these interviews were subsequently validated using databases and reports from official development assistance partners of the Department of Public Works and Highways (DPWH) in the Philippines.

The research focused on historical inventory and construction records of major infrastructure within and surrounding the Ortigas CBD, including roads, flyovers, underpasses, road widening or improvement projects, and mass transport railways linking the CBD. Additionally, site visits and observations were conducted to verify the presence of these major infrastructure and confirm their contribution to accessibility within the CBD.

d) *Factor 4: Branch liberalization policy*. The banking circulars, monetary board resolutions, and country-level financial situation reports were obtained, reviewed, and analyzed from the online disclosures and databases through the BSP's official website.

The BSP policy on bank liberalization and restrictions imposed in the key cities of Metro Manila were then compared to the economic working papers and articles published by the government think-tank, authoritative local literature about the Philippine financial system, and legislative reports from the congress' economic planning office.

The policy review focuses on the historical policy guidelines on branch location, requirements for opening new branches, and branch construction moratoriums.

5. Results and Discussions

5.1 Identification of Operating Environment Factors for Bank Branches

Results of the characterization at the level of bank management indicated that, aside from the volume or size of deposits available within the CBD, two significant operating environment factors emerged: *land use commercial potential* and *access to a fully developed transportation road network* (Table 4). The bank level perspective also marked the *presence of anchor customers (institutions or firms)* as the second most important factor in the operating environment.

Table 4 Highlights of Bank Management Level Interview on Branch Location Factors

Rank	Branch Location Factors
1	• Size/Volume of market deposit • Land use commercial potential • Access to a fully developed road network
2	• Availability of prospective markets/anchor institutions
3	• Presence of competitors
4	• Presence of a residential area • Operating standards (security/rent)
5	• Site standards (lot area/parking/flooding)

These bank branch location-decision factors which were corroborated in literature, underwent re-ranking through weights assignment by the 10 bank representatives following the Multi-Attribute Utility Technique (MAUT). The application of this technique aimed to formulate an enhanced list of branch location and operating environment factors in terms of their relative importance. To achieve this goal, the factors were listed in both rows and columns in a pairwise matrix illustrated in Table 5.

Table 5 Pairwise Matrix of Branch Location Factors

Branch Location Factors	Branch Location Factors/Attributes						Calculations		
	Average Volume of Deposit	Presence of Anchor Institutions	Land Use Commercial Potential	Access to Developed Road Network	Near Residential Areas	Presence of Competitors	Total	∑ Summation of Column "G"	Weights
	A	B	C	D	E	F	G	H	I
A Average Volume of Deposit	0	1	1	1	1	1	5	15	33.3
B Presence of Anchor Institutions	0	0	1	1	1	1	4	15	26.7
C Land Use Commercial Potential	0	0	0	1	1	1	3	15	20.0
D Access to Developed Road Network	0	0	0	0	1	1	2	15	13.3
E Near Residential Areas	0	0	0	0	0	1	1	15	6.7
F Presence of Competitors	0	0	0	0	0	0	0	15	0.0

Starting from the top row, each factor was examined against every location factor in the column and was rated according to the order of preference by the bank experts who participated in the ranking exercise. A factor deemed more important was assigned a value of "1", while a factor of lesser importance received a value of "0". Individual weights (column "I") for each location factor were then calculated by dividing the row total (column "G") by the sum of row totals under column "H".

The results of the MAUT indicated that the volume of deposits remained the most highly ranked factor in relative importance. Following this, the presence of anchor institutions, land use commercial potential, and access to developed road networks were ranked second, third, and fourth, respectively (Figure 4). These findings underscore the relative significance of operating environment factors in the decision-making preferences of banks regarding branch entry and expansion.

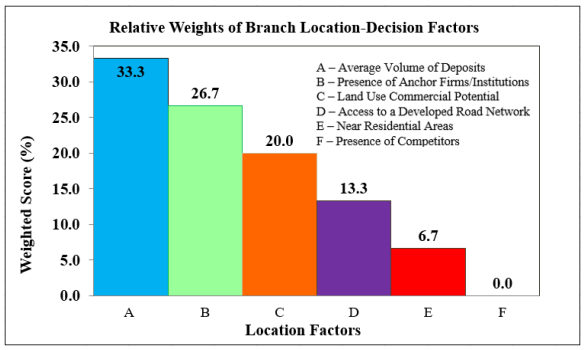

Figure 4 Rank of Branch Location Factors from Firm Level Perspective

5.2 Chronological Analysis of the Operating Environment Factors for Bank Branches and Transformation of Ortigas CBD Urban Form

A chronological analysis of the factors of the bank branch operating environment in relation to their establishment and concentration in the Ortigas CBD validates the factors identified by bank management experts. The evolution of these operating environment factors has led to the emergence of distinct urban forms, reflecting the CBD's transition into an economic hub. This urban metamorphosis aligns with agglomeration theories in existing literature, shedding light on the motivations behind banks' decisions to extend their branch network within the CBD. The findings of the chronological analysis over time are elaborated in the subsequent subsections, highlighting the major milestones that occurred during the periods covered by the research.

5.2.1 Circa 1930 – 1950: Residential Estate Development as an Offshoot of Business Partnership

In 1931, the ownership share of *Hacienda de Mandaloyon* was reorganized among Francisco Ortigas, Vicente Madrigal, B.C.M. Johnston, Fulgencio Borromeo, Clyde A. Dewitt, and Manuel L. Quezon, leading to reconceptualizing the establishment of an industrial, commercial, and residential estate. The reconceptualized plan envisioned a central area for commercial and residential development which is now the Ortigas Center or CBD.

Surrounding the CBD is a fringe area that serves as an extension of the residential and commercial development including industrial zones. The area occupied by Ortigas CBD fringe encompasses parts of Pasig City, Mandaluyong City, and Quezon City.

Residential estate development commenced with developing the properties in Little Baguio in San Juan, Barangay Plainview, and Addition Hills in Mandaluyong City, with land prices ranging from P1.00 to P3.00 per square meter for lot sizes between 700 and 5,000 square meters (Manila Nostalgia, 2023; Ortigas Foundation Library, 2022).

During this time, the Ortigas CBD underwent minimal development, while the CBD fringe at the Mandaluyong City area experienced residential growth due to migrants from Manila City, seeking a cooler and rural atmosphere. The establishment of the Wack Wack Golf and Country Club also contributed to the attractiveness of the area.

In 1935, the Philippine government established Camp Murphy, a military base located north of the Mandaloyon Estate (Lakansining, 2019). The camp was divided by Avenida 19 de Junio, with around 178 hectares used by the Philippine Army and Zablan Airfield, and 42 hectares by the Philippine Constabulary (now Camp Crame). Ortigas & Company donated approximately 50 hectares of the army camp to the government in 1935.

During war time (1942 – 1945), the American 248th Infantry established a general hospital at the intersection of Shaw Boulevard and Avenida 19 de Junio occupying a substantial block of land in the present location of Greenfield district towards the direction of Barangay Oranbo and Barangay Kapitolyo in Pasig City.

Improved accessibility to the Ortigas CBD started in 1940 with the development of a comprehensive network of major roads (Figure 5). A key artery, Avenida 19 de Junio, facilitated north-south connectivity within the CBD. This circumferential road was intersected by two perpendicular radial roads, facilitating east-west connections to other municipalities in Metro Manila. Shaw Boulevard, formerly known as Jose Rizal Avenue for the Mandaluyong City segment and Pasig Boulevard for the Pasig City segment, served as a significant radial road, demarcating the Ortigas CBD from the industrial zone at the fringe. Ortigas Avenue, previously named Rosario Highway, served as another radial road, delineating the northern side of the CBD from areas designated for high-end residential subdivisions.

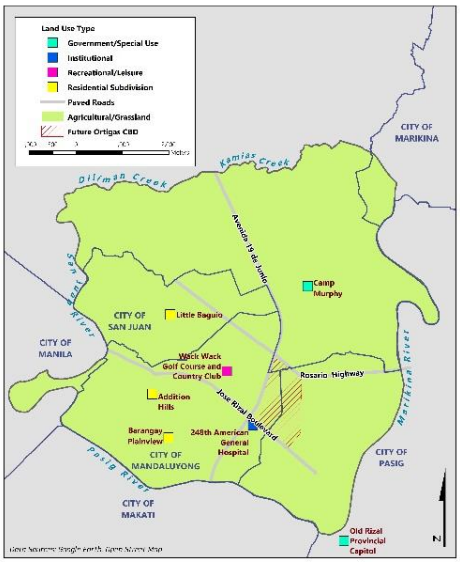

Figure 5 Ortigas CBD/Fringe Major Developments (1930 – 1950)

Source: Authors' Construct

Despite residential expansion, records of banking facilities within the CBD was lacking, with banking activities predominantly concentrated in the City of Manila Binondo-Sta.Cruz-Intramuros area. Although foreign bank presence initially increased nationwide, growth was stunted by a moratorium imposed by the BSP (then Central Bank of the Philippines). The moratorium was lifted in 1949, allowing the entry of new foreign banks into the region (Milo, 2001).

5.2.2 Circa 1951 – 1960: Expansion of Spatial Development Orientation through the Development of Residential Subdivisions, Pioneer Anchor Institutions, and Banking System

The reconstruction of Ortigas Avenue was finished in 1956, spanning from its junction with Highway 54 (new name given to Avenida 19 de Junio in 1950) to its intersection with Carretera de Santolan (now Colonel Bonny Serrano Avenue). Formerly, Carretera de Santolan included the segment towards Rosario Highway junction with Circumferential Road 5 or C5 (refer to Figure 6).

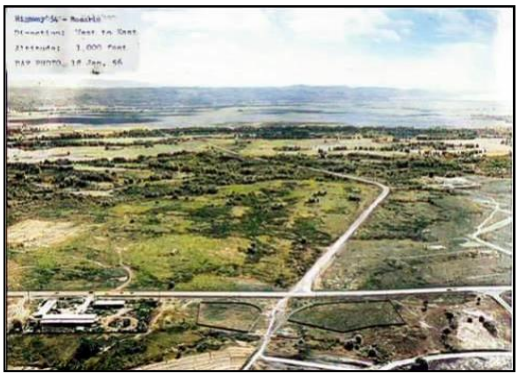

Figure 6 Highway 54 (EDSA) Junction with Ortigas Avenue in the direction of C5, Circa 1956

Source: Memories of Old Manila & Beyond (2019)

The development of these roads by the government motivated Ortigas and Company, the Mandaloyon real estate firm, to strategically planned the north and eastern fringe of the present Ortigas CBD for elite residential subdivisions accessible to schools, hospitals, churches, military camps, water supply, and private golf course.

Notable developments include the Wack-Wack subdivision in Mandaluyong, alongside other upscale residential areas in the late 1950s catering to World War II veterans like Blue Ridge A, and Blue Ridge B along Katipunan Avenue Extension in Quezon City (Lakansining, 2020a; Manila Nostalgia, 2015). The influx of institutions and residences led the transformation of grasslands into a mix of residential subdivisions and institutional zones. About the same time, the south and southeastern portion of the Ortigas CBD fringe were planned for industrial land use alongside the pivot to import substitution industry (ISI) policy of the Philippine government in the 1950s (Figure 7). This paved way for the shifting of nationwide priorities from agricultural to capital-intensive industrial development between 1947 to 1960 (Sicat, 1968; Takagi, 2014). The United Laboratories (UNILAB) in 1954 was among the industries that established the first pharmaceutical factory at the southern fringe of the Ortigas CBD (MLHG, 2022).

As domestic industries expand to produce goods previously imported, they require bank financing for facilities, working capital, and trade finance. This demand favored bank branch entry in and around the CBD area, where cash transactions of domestic industries and workers is high. The government supported the ISI policy by relaxing entry restrictions for domestic banks in the early 1950s and 1960s, while the Central Bank of the Philippines played a key role in developing the banking system to meet the economy's financing needs after the war (Milo, 2001).

Aligned with the industrialization policy, the Local Autonomy Act (RA 2264) was enacted in 1959, bestowing city and municipal governments with enhanced fiscal, planning, and regulatory authority (Supreme Court e-library, n.d.). Emboldened by this legislative directive, the Municipal Council of Mandaluyong delineated the southern portion of the Ortigas CBD fringe, extending from Shaw Boulevard towards the Pasig River, as an industrial and commercial zone through Resolution No. 27, series of 1960 (lawyerly.ph, n.d.).

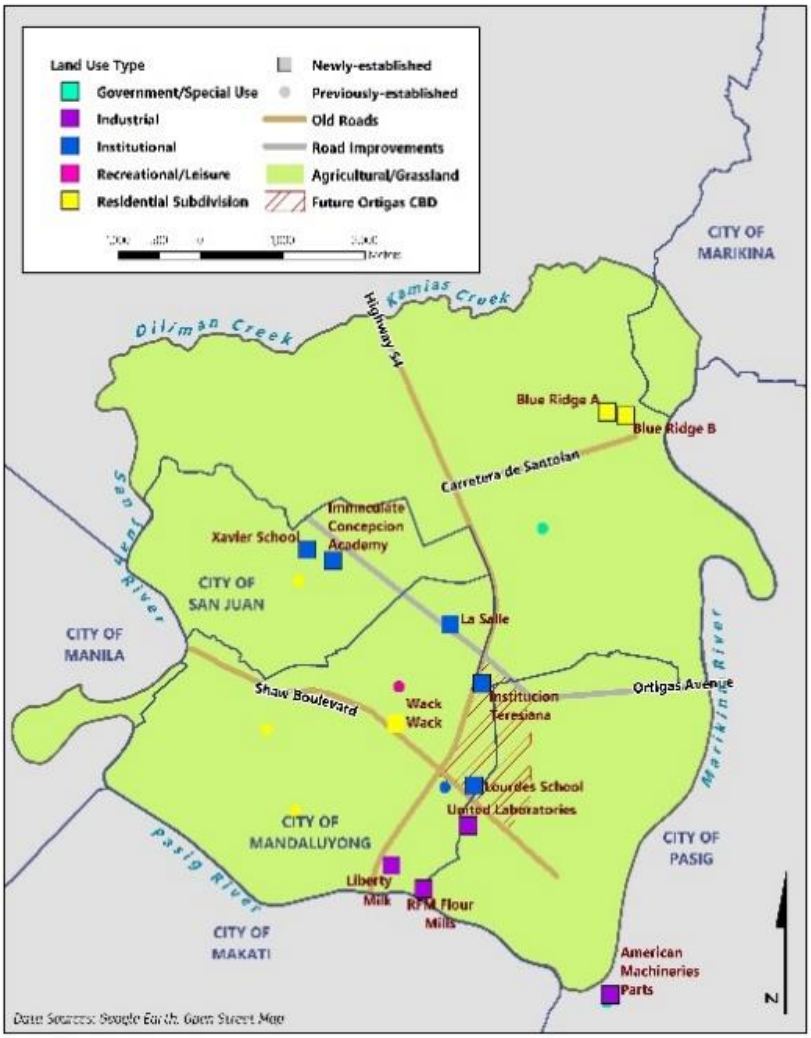

Figure 7 Ortigas CBD/Fringe Major Developments (1951 – 1960)
Source: Authors' Construct

Table 6 Pioneer Anchor Institutions Close to Ortigas CBD, 1951 to 1960

Institutions	Year of Establishment	Features
Lourdes School of Mandaluyong	1959	Built facilities at the southern border of the Ortigas CBD
La Salle Greenhills	1959	Main building was completed in 1959[1] northeast of the CBD
Xavier School Greenhills	1960	Held classes beginning 1960 on a 7.5-hectare property of what was then a sparsely covered rice field and grassland[2]
Immaculate Concepcion Academy Greenhills	1960	Elementary department and kindergarten opened in 1960[3]
Institucion Teresiana (present name is Saint Pedro Poveda School)	1960	Donated by the Ortigas family along Highway 54 (present name is EDSA)

Source: [1]https://lsgh.edu.ph/history-of-la-salle-green-hills/; [2]https://xs.edu.ph/index.php/about-xavier/; [3]https://icagh.edu.ph/about-ica/history/

Residential development in the post-war era shifted towards eastward spatial expansion from the City of Manila. This shift was prompted by the reconstruction efforts of the residential and commercial districts in the inner core of Manila (Lakansining, 2020b). It resulted to the migration of affluent Manila City residents and establishments of institutions in and around the Ortigas CBD (Table 6).

5.2.3 Circa 1961 – 1970: Further Expansion of Demand for Residential Land by the Elite and Attraction of Private Investments as Triggers of Urban Primacy and Economic Dynamism

The demand for residential land by the elite continued in the early and late 1960s with the development of White Plains Village by the Quezon City Development and Financing Corporation (QCDFC) along the Katipunan Avenue extension in the direction of Ortigas CBD (Lakansining, 2020a).
Residential development attracted private investments, increasing the supply of workers in the surrounding environment.

The construction of the Manila Electric Company (MERALCO) office in 1964 marked the first major development along Ortigas Avenue. Acquired by the Lopez family from its American owners, MERALCO inaugurated a new building complex in 1969, featuring a world-class theater, a tennis court, the John Cotton hospital facility, and a restaurant. Another significant addition to the CBD fringe was the Greenhills Shopping Center owned by Ortigas and Company, which commenced operations in 1969.

The late 1960s aerial view in Figure 8, captured at the intersection of Epifanio delos Santos Avenue (EDSA) and Ortigas Avenue, illustrates enhanced accessibility due to road network upgrades along EDSA, Ortigas Avenue, and Shaw Boulevard. This transformation facilitated a shift in land use from grasslands to a diverse blend of residential, institutional, and commercial areas.

Figure 8 EDSA – Ortigas Avenue Intersection in the 1960s

Source: Memories of Old Manila & Beyond (2015a)

The Ortigas CBD fringe (Figure 9) from Shaw Boulevard towards the southern direction of Pasig River depicted an industrial land use where major industrial plants are added from the prior 1950s period. Among the industries reported by the Mandaluyong Local Historians Guild (MLHG, 2022) include Union Carbide, Atlantic Gulf & Pacific Company (AG&P), Ricoa Chocolate, Liberty Milk, Reynolds Aluminum, Park and Davies Pharmaceutical, Bonifacio Motors, Abbott Laboratories, Menzi Zipper, and Puyat Steel.

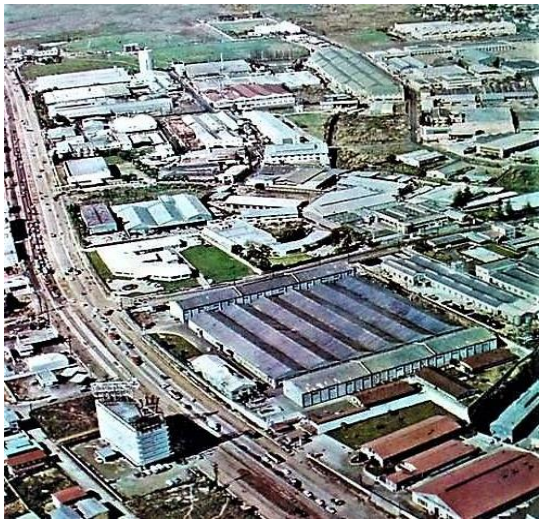

Figure 9 Industrial Complex along EDSA, Mandaluyong City Northbound

Source: Memories of Old Manila (2020)

The latter part of the 1960s demonstrated a primacy of population and increased economic activities, including banking in Metro Manila (Mercado, 2002). The Central Bank of the Philippines observed a particular growth of small banks, which prompted it to raise the minimum capital requirements to effectively manage the liquidity risks typically associated with less capitalized banks (Emery, 1976, as cited by Milo, 2001).

In 1963, *FEATI bank* established a bank branch at the Ortigas CBD fringe near the junction of EDSA and Shaw Boulevard. This was followed by the *Philippine Commercial and Industrial (PCI) Bank* which opened a branch within the Ortigas CBD in 1970 located at the lobby of the MERALCO building. Additional bank branch anchor customers increased since 1967 with the establishment of The Medical City (formerly AB Sison Hospital), Saint Paul School of Pasig, Ortigas Land and Company office building located at the corner of Ortigas Avenue and MERALCO Avenue, and EDSA Central Mall at the junction of EDSA and Shaw Boulevard (www.philstar.com, 2003). Figure 10 illustrates the emergence of a sprawling residential, business, and institutional area at the Ortigas CBD and fringe area.

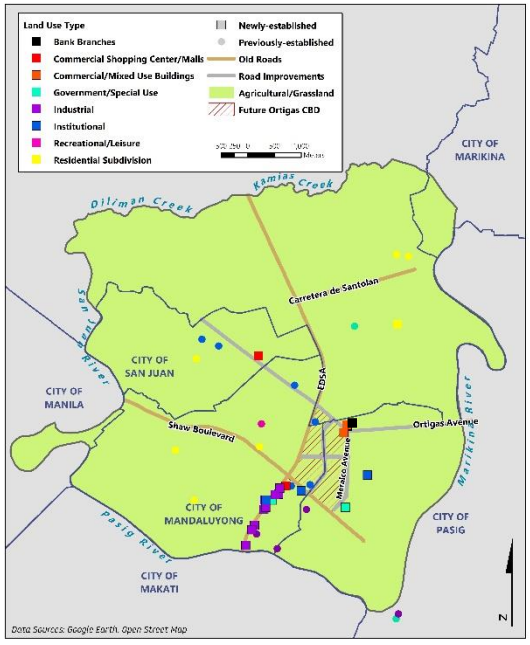

Figure 10 Ortigas CBD/Fringe Major Developments (1961 – 1970)

Source: Authors' Construct

5.2.4 Circa 1971 – 1980: Reinforcement of the Center of Economic Gravity and Surge in Commercial Activity Creating Venues for New Bank Branches

The Ortigas Center area emerged as a burgeoning residential hub within Metro Manila, also gaining recognition as an emerging market center with development increasingly concentrated towards the region's east side. The construction of the Manila Chronicle Building in 1971, later renamed the BENPRES Building, catalyzed the growth of the CBD's economic nucleus. Major anchor institutions established in 1975 included the National Economic and Development Authority (NEDA) headquarters and the ULTRA sports stadium. Additionally, the Greenhills Shopping Center area underwent enhancements with the construction of the new Virra Mall.

Public investments in infrastructure, notably the EDSA – Shaw tunnel, bolstered spatial interaction. The influx of anchor institutions attracted commercial activities within and around the CBD, prompting the development of high-rise structures like Strata 100 and the Padilla Building in 1977. In 1978, the PHILCOMCEN building was erected along Ortigas Avenue, followed by establishing the Integrated Bar of the Philippines (IBP) near Julia Vargas Avenue and San Miguel Avenue in 1979.

These buildings accommodated new bank branches, including the *Philippine National Bank (PNB)* at the PHILCOMCEN building, the *Bank of the Philippine Islands (BPI)* at the Chronicle building, the *PCI Bank* at Strata 100 (Figure 11), and the *Metrobank and Hong Kong and Shanghai Banking Corporation (HSBC)* branches, which opened in 1980, at the Ortigas Building.

Figure 11 Strata 100 and Padilla Building along Emerald Avenue in the 1970s

Source: Memories of Old Manila & Beyond (2015b)

Also in the 1970s, new high-end residential subdivisions were developed. Valle Verde Subdivision expansion and Saint Ignatius Village were completed around 1978 (Figure 12). Following in 1980 were the Corinthian Gardens Village and Green Meadows Village (Lakansining, 2020a).

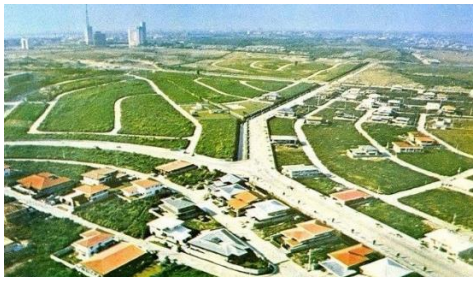

Figure 12 Ortigas CBD Skyline from Valle Verde Lanuza and Martin Street

Source: Manila Nostalgia (2014b)

These major land developments depicted in Figure 13, both within and surrounding the Ortigas CBD, received substantial backing in 1975 through the implementation of the Integrated Reorganization Plan (IRP). This initiative led to the establishment of the Metro Manila Commission (MMC) and the delineation of four municipalities and 13 cities within Metro Manila, including Pasig (Presidential Decree 824, 1975). The IRP, introduced by the NEDA, was formulated in accordance with the "Growth Center Strategy."

The design and approach of the IRP were structured to align with the framework of "concentration-decentralization" of the Ministry of Human Settlements. The framework emphasized growth centers such as CBDs as the focal points for both public and private development endeavors and investments (Corpuz, 1987).

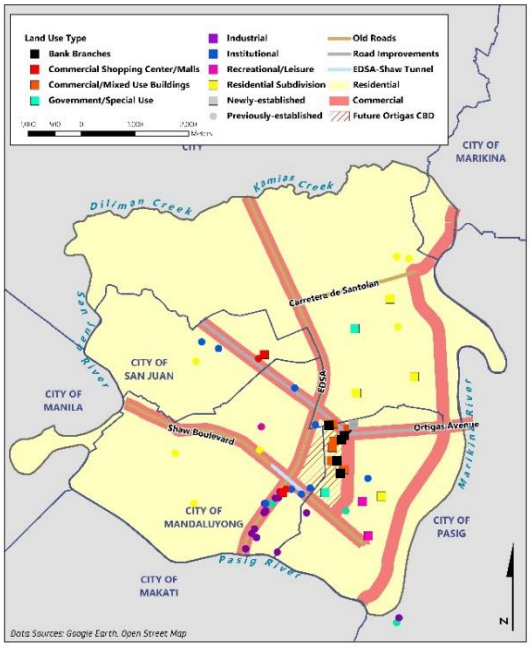

Figure 13 Ortigas CBD/Fringe Major Developments (1971 – 1980)

Source: Authors' Construct

In 1972, significant banking policies were enacted with the approval of the New Central Bank Act and the General Banking Law, marking pivotal developments in the banking sector. These policies aimed to advance the merging and consolidation of banks to enhance intermediation efficiency. Emphasizing the notion that larger banks contribute to a more stable banking system, the government concurrently raised the minimum capital requirements. Additionally, provisions were made to permit foreign equity participation of up to 30 percent of the voting stock in existing domestic banks (Lamberte, 1989).

These policy shifts precipitated notable transformations within the financial landscape, leading to the growth and fortification of financial institutions. Introduction of novel financial instruments such as commercial papers and movable asset mortgage-backed securities further diversified the financial toolkit. Concurrently, a comprehensive five-year roadmap was instituted to facilitate the establishment of regional bank branches. Moreover, in 1970, the BSP introduced a foreign currency deposit system, laying the groundwork for offshore banking, which was formally established in 1976, thereby broadening the scope of financial services available within the banking sector.

5.2.5 Circa 1981 – 1990: Growth in Bank Branches Amidst Financial Industry Crisis

During the period spanning from 1983 to 1986, marked by the EDSA People Power Revolution, the financial sector grappled with a crisis that reverberated through bank branches from 1980 to 1982, owing to a confluence of domestic political and economic upheavals (IMF, 1991). Moreover, the global recession in the early 1980s exerted additional pressure on the Philippine financial system, characterized by inadequate savings mobilization, inefficient resource allocations, and high intermediation costs attributed to limited competition and small-scale banking operations during the early part of the decade (Okuda, 1990).

The establishment of new bank branches faced unfavorable conditions amid the series of coup d'état in 1987, 1989, and 1990. Between 1981 and 1987, three commercial banks, 32 thrift institutions, and two private banks came under intervention, with two other government financial institutions requiring bailouts from the BSP (IMF, 1991). Consequently, anchor institutions, such as shopping centers, hospitals, schools, churches, entertainment venues, and multinational corporations, remained limited in and around the CBD fringe at the turn of the century.

Notable establishments during this period included the Center for Research and Communication (later renamed as University of Asia and the Pacific) in 1982, the Hanston Building constructed in 1982, the Securities and Exchange Commission (SEC) in 1983, the Asian Development Bank and Benguet Mining Center in 1983, the San Miguel Corporation Headquarters in 1984, and the SM Megamall and Robinsons Galleria Mall in 1989 (Figure 14).

Figure 14 EDSA - Ortigas Avenue Intersection South Bound towards Makati City

Source: Manila Nostalgia (2014a)

Government offices began to occupy spaces within the CBD during this period, including the Ministry of Human Settlements (MHS) at Strata 100, the Kilusang Kabuhayan at Kaunlaran (KKK) office under MHS at Hanston Building along Emerald Avenue, the Ministry of Transportation and Communications at the PHILCOMCEN building, and an office under the Ministry of Trade and Industry at the Chronicle building. In 1986, infrastructure development spearheaded by the Ministry of Public Works, Transportation, and Communication (MPWTC) further fueled the commercial growth of the Ortigas CBD, particularly on its eastern side.

This initiative involved the expansion and connection of the north and south ends of Circumferential Road 5 (C5), forming a geometric quadrangle road network with Ortigas Avenue and EDSA surrounding the Ortigas CBD (Figure 15). This infrastructure enhancement facilitated economic and physical movement among Parañaque, Taguig, Makati, Pasig, Marikina, and Quezon City. Subsequently, the Ortigas Center Association was established, leveraging the collaborative efforts of Ortigas Land and Company and other lot/building owners to strategically plan the Ortigas CBD's development.

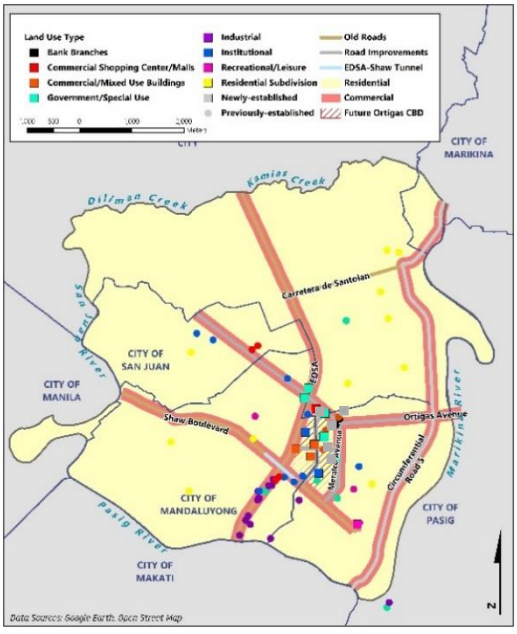

Figure 15 Ortigas CBD/Fringe Major Developments (1981 – 1990)

Source: Authors' Construct

5.2.6 Circa 1991 – 2000: Lifting of the Geographical Restrictions on Establishing New Bank Branches

As of June 1999, the BSP's data indicated that Metro Manila's banking office ratio to the number of LGU reached 155, accounting for approximately 2,635 branches, including head office branches (Milo, 2001). The early 1990s brought about market optimism for economic recovery and political stability, leading to the BSP's lifting of geographical restrictions on establishing new bank branches in 1993. However, specific prudential requirements regarding capital adequacy, liquidity, profitability, and management soundness were enforced (Paderanga, 1996).

This regulatory shift favored the business sector and spurred a surge in real estate acquisition, resulting in the construction of new high-rise office buildings, corporate offices, and hotels within the CBD. Notable anchor institutional landmarks completed during this period include the *Bank of Commerce Corporate Office* (1991), Shangri-La Hotel (1992), Jollibee Center Building (1993), The Medical Plaza and the Renaissance 2000 Building (1995), Tektite Towers which housed the Philippine Stock Exchange (1995), and Taipan Place where the World Bank Manila hold their office (1996).

The Asian financial crisis from 1997 to 1998 slowed down prospective high-rise developments and projects, affecting the property and banking sectors. Ongoing leisure and office projects that were able to complete their buildings include, Robinsons Equitable Office Tower and *Robinsons Bank* (1997), Linden Suites Hotel (1998), Discovery Suites Hotel (1999), and The Orient Square (1999). These facilities (Figure 16) opened new employment, sustaining economic and commercial activity in the CBD, albeit resulting in traffic congestion.

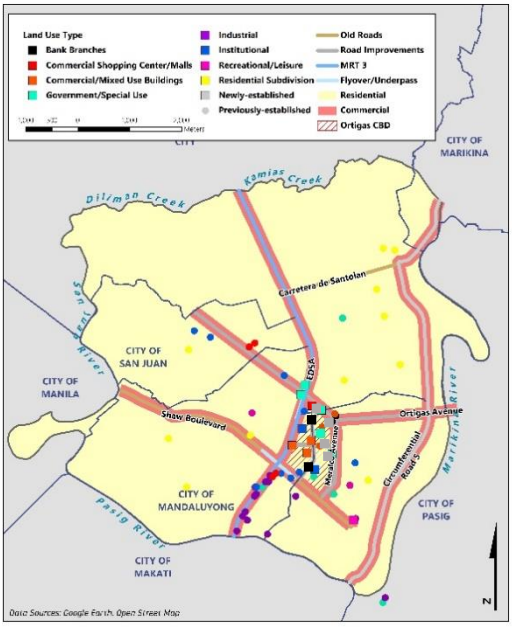

Figure 16 Ortigas CBD/Fringe Major Developments (1991 – 2000)

Source: Authors' Construct

To cushion the economy within the CBD by keeping the area accessible to the public, the government constructed the EDSA-Ortigas Interchange in 1991 and completed the expansion of C5 (E. Rodriguez Jr. Avenue) southern road segment in 1996. New infrastructure improvements also included the Edsa-Shaw Flyover (1998) and the commissioning of the Metro Rail Transit 3 (1999) provided convenience and increased alternative public access to the CBD.

Residential development also persisted, catering to the demand for high-end residential villages like Corinthian Hills, Acropolis Subdivision, Queensville Court, and the Enclave Villages (Lakansining, 2020a).

The number of banking offices in Metro Manila rose to about 1,904 in 1990, reflecting a growth distribution from 9.8 percent in 1990 to 112 offices per LGU in response to the favorable BSP regulatory environment and increasing commercial investments. Although there is no available archive of bank branch addresses that were opened in the CBD during this period, the 160 bank branches reported by Pasig City government (Pasig City, 2014) imply that these are mostly located within the CBD given the high economic activity relative to the other areas of the city.

By the end of 2000, the number of bank branches reached 2,529 out of the country's total of 6,561, equating to a density of 155 branch offices per local government unit (LGU). Pasig City alone has 197 banking offices by 2000. The high concentration of bank branches in Metro Manila prompted the BSP to declare an indefinite moratorium on establishing new banks and branch expansion of existing banks, excluding microfinance-oriented banks, in August 1999 (BSP, 2016).

5.2.7 Circa 2001 – 2010: Creation of Foreign Demand for Office Spaces in the Information Technology – Business Process Outsourcing Sector

From 2001 to 2010, foreign investors created demand for office spaces in the information technology sector (www.philstar.com, 2012) business process outsourcing (IT-BPO) and Philippine offshore gaming operations (POGO) driving the entry of corporate office high-rise buildings.

Data extracted from the online platforms of various property developers between 2000 and 2010 revealed an expanding anchor customer base with the completion of 18 new buildings within the CBD and immediate CBD fringe (Figure 17).

These include Wynsum Corporate Plaza (2000), Prestige Tower (2000), St. Francis Square (2000), Raffles Corporate Center (2000), One San Miguel Avenue (2001), The Podium (2002), Galleria Regency (2003), Union Bank Plaza (2004), Crowne Plaza (2004), The Medical City (2004), Orient Square (2006), The Malayan Plaza (2006), Metrowalk (2006), Lancaster Suites 1 (2007), One Corporate Center (2009), St. Francis Tower 1 (2009), St. Francis Tower 2 (2009), and Joy-Nostalg Center (2009).

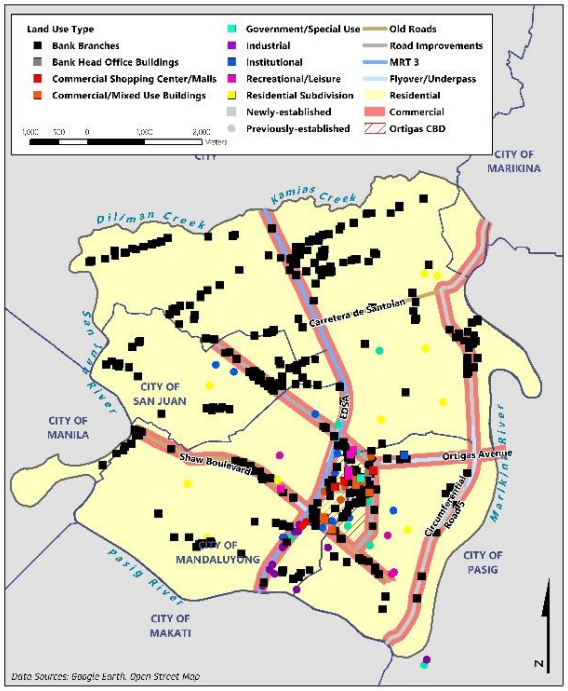

Figure 17 Ortigas CBD/Fringe Major Developments (2001 – 2010)

Source: Authors' Construct

Bank branches in Pasig City (Pasig City, 2014) decreased from 197 in 2000 to 167 in 2005 due to the General Banking Law imposing a three-year moratorium on new bank entries. However, the CBD saw economic growth driven by IT-BPO and POGO sectors (Ortigas Land, n.d.). By 2010, the CBD had 107 branches, with 96 more within a two-kilometer radius. This led to traffic pattern changes, prompting infrastructure improvements like the Julia Vargas – MERALCO flyover and the Mandaluyong-Shaw Boulevard Flyover. Additionally, residential expansion required upgrades such as widening Ortigas Avenue Extension and building the C5 – Ortigas Interchange in 2004, enhancing connectivity and highlighting the interaction between urban expansion, transportation, and economic growth.

5.2.8 Circa 2011 – 2019: Expansion of Bank Branch Concentration

Between 2011 and 2019, there was a noticeable increase in the proportion of bank branches located within the Central Business District (CBD) compared to the total number of branches in Pasig City. This proportion rose from 50 percent in 2011 to 66 percent by 2019. These findings were derived from the total count of bank branch addresses collected from various online directories of different banks and cross-validated with year-end records from the Philippine Deposit Insurance Corporation (PDIC).

In 2019, it was observed that there were approximately 139 branches operating within the CBD, with an additional 137 branches located within the two-kilometer fringe area surrounding the CBD. Notably, a significant portion of these branches, comprising 72 within the CBD and 59 within the fringe area, had remained in the same location since 2010.

This growth in branch presence has been driven by the consistent increase in newly opened branches over the years, which grew from 203 branches in 2010 to 276 branches in 2019 when considering both the CBD and the fringe area combined (Figure 18).

During this period, several significant anchor institutions/customers or commercial buildings were constructed in Ortigas CBD (Ortigas Land, n.d.), including BSA Twin Tower (2011), Exchange Regency (2011), Capitol Commons (2011), Lancaster Suites 2 (2012), Ateneo School of Medicine (2012), Asia United Bank (2012), Estancia Mall (2014), ADB Avenue Tower (2014), One Shangri-La Place 1 (2014), One Shangri-La Place 2 (2014), Cyberscape Beta (2014), Marco Polo Hotel (2014), AIC-Burgundy Empire Tower (2015), Avant-Garde Residences (2015), The Currency (2015), BDO Corporate Center (2016), Ayala Malls The 30th (2017), Royalton (2019), Jollibee Tower (2019), and Imperium (2020).

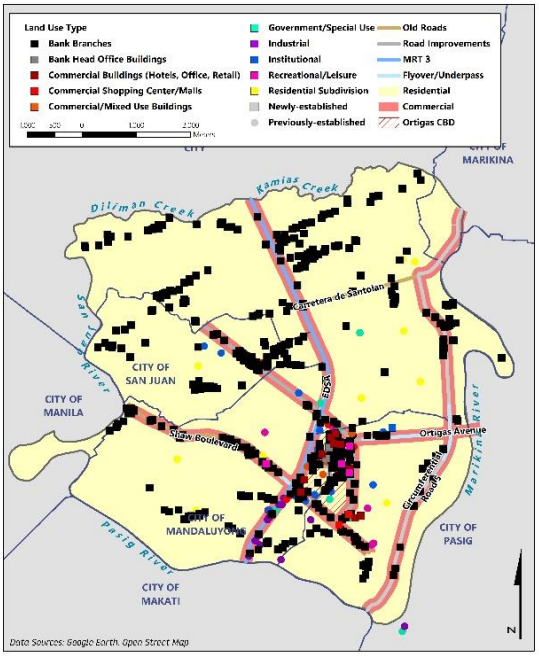

Figure 18 Ortigas CBD/Fringe Major Developments (2011 – 2019)

Source: Authors' Construct

5.3 Triggers of Bank Branch Entry and Concentration based on Chronological Analysis of Bank Branch Operating Environment Factors

The transformation of land use from grassland to the mix uses of residential, commercial, and institutional triggered the development of the banking system that capitalized on urban primacy and growth of economic activities. This evolution pattern serves as the anchor of this research on establishing the entry of branches in the CBD and its intersection with bank location decisions. Based on the chronological analysis, the following are the identified triggers of bank branch entry, expansion, and concentration.

Growth in the Number of Anchor Customers/Institutions. The entry and growth of new bank branches were attributed to the presence of more anchor institutions. This scenario was also triggered by the lifting of the BSP moratorium on the establishment of new branches in 2016. Added to this was the emerging and growing IT-BPO management sector and the Philippine Offshore Gaming Operations (POGO) operations in 2019. As of December 2018, the establishments within the Ortigas CBD occupied approximately 16 percent of the 10.6 million square meters of leasable office spaces in Metro Manila (Abad, 2019).

Between 2010 and 2015, there was a 28 percent increase in bank branches in Pasig City, followed by a 14 percent increase from 2015 to 2019 (Table 7).

Table 7 Bank Branch Count and Growth Rates

No.	Metro Manila LGU	Branch Count			Branches Growth Rates (%)	
		2019	2015	2010	2016 - 2019	2010 - 2015
1	Quezon City	859	767	628	12	22
2	Manila City	642	599	546	7	10
3	Makati City	530	493	407	8	21
4	Pasig City	262	229	179	14	28
5	Taguig City	199	147	78	35	88
6	Parañaque City	198	165	135	20	22
7	Mandaluyong City	142	129	111	10	16
8	Pasay City	131	101	80	30	26
9	Caloocan City	125	113	99	11	14
10	Muntinlupa City	124	111	90	12	23
11	San Juan City	118	102	86	16	19
12	Marikina City	89	84	70	6	20
13	Las Piñas City	82	81	66	1	23
14	Valenzuela City	81	70	61	16	15
15	Malabon City	51	49	41	4	20
16	Navotas City	24	24	20	0	20
17	Municipality of Pateros	14	13	13	8	0
		3,671	3,277	2,710	12	21
			TOTAL		AVERAGE GROWTH RATE	

Source: Authors' construct from the Philippine Deposit Insurance Corporation data on bank branches in Metro Manila

As of 2019, Pasig City ranked fourth in Metro Manila in terms of the total number of bank branches. Despite adopting alternative banking technologies such as automated teller machines (ATMs), internet banking, and mobile banking, there was a notable expansion in the branch network within the city.

Expansion in the Magnitude of Demand for Financial Services. The growth in bank branches indicates the rise in the demand for financial services attributed to the agglomeration of economies within the CBD. The IT-BPO sector created a demand for office spaces in hotels, residential condominiums, and other services that require forward and backward linkages from the other economic sectors (OCAI, n.d.).

Commercial Potential Enhanced by Area Development for New Buildings and Facilities Construction. The upswing in the demand for office spaces led to the construction of 21 new buildings and facilities in 2019. The development caused the conversions to mixed uses of around 80 hectares of land in 2012 complementing the spatial strategy of densification and pedestrian-friendly district (Pasig City, 2014).

Improvement of Road Networks for Access and Connectivity. The development plan for Ortigas Center aimed to position it as a leading business and financial hub, which is in line with the Comprehensive Land Use Plan (CLUP) of Pasig City. This strategic objective was consistent with the goals of the National Spatial Strategy (NSS), which emphasized agglomeration, connectivity, and resilience to enhance efficiency and maximize the benefits of scale.

5.4 Emerging Bank Branch Operating Environment Factors in Planning for Financial Districts

In both the Philippines and other localities, there is a notable absence of local planning standards specifically tailored for financial districts. Local planning initiatives should incorporate key considerations to foster the establishment and concentration of branches within these districts. These include proximity to, or integration with, a well-developed national primary (similar to EDSA and E. Rodriguez Avenue/Circumferential Road No. 5) or national secondary (such as Ortigas Avenue and Shaw Boulevard) road network. Additionally, the physical layout of these districts should be strategically designed to facilitate accessibility to anchor institutions, thereby promoting branch entry and expansion.

While deliberate plans to position the Ortigas CBD adjacent to or enveloped by a developed road network may not have been formally established, empirical data derived from branch addresses indicate that areas benefiting from such accessibility are favored locations for branch entry.

In addition, the key to the survival of a financial or CBD is the continuous revisions or updating in land use plan as unveiled in the chronological analysis of location factors for Ortigas Center CBD. Amidst the recurrence of political, economic, and financial crises that have struck the Philippines, the Ortigas CBD can continuously entice entry of anchor customers/institutions through time.

The expansion of commercial areas within the CBD is attributed to planning interventions led by the CBD business locators association, in collaboration with the property owner and developer of the Ortigas estate. These interventions aimed to promote mixed-use development, thereby diversifying and expanding the commercial landscape. The local government planning office supported these initiatives by updating local land use plans and zoning ordinances. Consequently, this facilitated the alignment of spatial development direction at the city level.

6. Conclusions

For bank branch entry, expansion, and concentration to occur, the surrounding environment has to evolve accordingly. An important impetus in the evolution of branch banking environment is improving road networks within and around a planned area like a CBD. This condition has been observed in the Ortigas CBD beginning with the completion of EDSA, the expansion of Ortigas Avenue, the extension of circumferential road number 5 (C5)/E. Rodriguez Avenue, and the interconnection with the metro rail line including key flyovers and interchanges. These road improvements have encouraged the development of residential villages, the entry of vital institutions, and the inducement of customers, workers, and the general public. This group of individuals and institutions are the key anchor customers needed by the bank branches to remain viable and sustainable in space.

The Ortigas CBD case also underscores the role of area development planning in ensuring that land use changes are introduced and adapted to the requirements of existing bank firms including those considering entry into the CBD space. The creation of the Ortigas Center Association for the purpose of advancing the land use planning for the business district development from the 1980s to the 1990s and conversion of certain areas to mixed-used development by the LGU have allowed the creation of vertical spaces which bodes well for real estate value and commercial investments.

The identified operating environment factors have ushered the entry of branches through time even as financial, political, and economic crises threatened bank expansion. Lifting of the moratorium for bank and branch entry in 2012 and again in 2016 also demonstrated the precept that regulation plays a vital role in shaping market sentiments and investments of anchor customers/institutions within a CBD which is, in turn, auspicious for branch spatial concentration. Policies regulating entry and/or expansion do not depend on fixing the number of branches nor on establishing levels of saturation, but rather on strengthening the financial sector by increasing the firm-level capitalization.

The regulatory approach adhered to in 2012 and 2016 made sense as shown by the evolution of the Ortigas estate into a CBD when domestic and external economic events were dynamic and market forces tended to gravitate towards such events. This observation is aligned with industry operational practices where the decision to close or maintain an unprofitable branch rests with the firm and not with the central bank such as the BSP.

Overall, chronological analysis established the interconnections of factors where change in land use commercial potential and continuous development of road network for transport access had encouraged influx of anchor institutions which were the primary sources of branch deposits. The results of chronological analysis proved that regulation had an undeniably central role in forming market attitudes and investments of anchor institutions who were the definitive attraction of branches toward CBDs.

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Exposure Analysis of Tacloban City's Humanitarian Supply Chain to Climate-Related Hazards: Towards a Risk-informed Site Selection Process

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Abstract

Public service continuity calls for facilities that can withstand the impacts of hazard events without significant damage or loss of functionality. Using geospatial analysis, the study evaluated the coastal City of Tacloban's critical point facilities (CPFs) and road network— those identified to provide essential support services in times of crisis - for exposure to sea-level rise (SLR) and the three other hazards of (1) flooding, (2) storm surge, and (3) rain-induced landslide. The study found that many of the City's CPFs and most road networks linking these facilities are at high risk of some, if not all, of these hazards. This finding substantiates the City's Super Typhoon (ST) Haiyan experiences, confirming weaknesses in the design of disaster supply chains that should be resolved to prevent further impacts on affected sectors. This study illustrates how the exposure analysis of humanitarian supply chain assets to various climate-related hazards can provide decision-makers with a firm understanding of the number and location of assets that may be compromised per hazard. Towards evidence-based decision-making, the paper elaborates on using Geographic Information Systems (GIS)-based conjunctive multi-criteria decision analysis (MCDA) for risk-informed site selection.

Keywords: hazard exposure analysis, climate-related hazards, humanitarian supply chain, public service continuity, Sustainable Development Goals 11

1. Introduction

Between 1998 and 2017, climate-related and geophysical disasters killed 1.3 million people and left a further 4.4 billion injured, homeless, displaced, or in need of emergency assistance globally. While most fatalities were due to earthquakes and tsunamis, 9 out of 10 disasters were attributed to extreme weather events (CRED and UNDRR, 2018). As a direct result of over 11,500 extreme weather events within the same decade, more than 526,000 people died worldwide, with losses estimated to be US $ 3.47 trillion, excluding costs of residual risks or unavoidable loss and damage (Eckstein et al., 2018). The Climate Change 2014 Synthesis Report warns that further global warming will amplify existing risks and create new risks for natural and human systems, including urban systems. The effects of heat stress, storms and extreme precipitation, inland and coastal flooding, landslides, air pollution, drought, water scarcity, sea-level rise, and storm surges will be dire for those lacking essential infrastructure and services or living in exposed areas which may result in massive displacement (IPCC, 2015).

Recognizing that sustainable development and poverty eradication are significantly hampered by human and material losses due to disasters, rather than responding to disasters, the Sendai Framework for Disaster Risk Reduction (SFDRR) 2015-2030 shifted the focus towards addressing underlying factors that expose people, communities, and assets to risks and undermine their capacity to adapt to, respond, or bounce back from hazard events. Towards this end, the SFDRR seeks to "substantially reduce disaster damage to critical infrastructure and disruption of basic services by 2030" and "promote the mainstreaming of disaster risk assessments into land-use policy development and implementation, including urban planning" through multi-hazard approach and inclusive risk-informed decision-making (UNDRR, 2015). Among the sustainable development goal (SDG) targets is to "develop quality, reliable, sustainable, and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all" by 2030 (SDG 9.1).

Eckstein et al. (2020) analyzed the quantified impacts of extreme weather events on fatalities and economic losses from 1999-2018 in the Global Climate Risk Index (GCRI) 2020. The study noted the ten most affected countries in the last two decades, namely: 1) Puerto Rico, 2) Myanmar, 3) Haiti, 4) Philippines, 5) Pakistan, 6) Vietnam, 7) Bangladesh, 8) Thailand, 9) Nepal; and 10) Dominican Republic. The study also listed the ten most affected countries by extreme weather events in 2018, namely: 1) Japan, 2) Philippines, 3) Germany, 4) Madagascar, 5) India, 6) Sri Lanka, 7) Kenya, 8) Rwanda, 9) Canada; and 10) Fiji. In both indices, the Philippines is among the Top 5 countries threatened by extreme weather events and recurrent catastrophes from tropical cyclones.

The Philippines is uniquely exposed to a plethora of hazards, including recurrent typhoons, earthquakes, and active volcanoes. Between 1900 and 2014, the Disaster Risk Reduction in the Philippines Status Report indicates that typhoons exhibit extreme spatial variability, uneven distribution frequency, and extent of impact. The same report also notes that each year, about 20 tropical cyclones enter the Philippine territory on average, with approximately eight or nine making landfall, making them the most significant contributors to disaster damage in the country. Disaster records in the country show that cyclones resulting in landslides, storm surges, and floods have caused the most significant losses of life and property. Six super-scale events, including Super Typhoon Haiyan, caused 80 percent of these disasters (UNDRR, 2019). Along with a projected temperature increase of 1.8°–2.2°C and an increase in precipitation, with some days exceeding 300 mm of rain in 2050, sea levels are also expected to rise 48-65 cm by the year 2100 in the Philippines. This rate is faster than the global average of 30 cm (USAID, 2017). There is a strong impetus for mainstreaming disaster risk reduction and climate change adaptation (DRR-CCA) to improve resilience in the country.

Developing robust humanitarian supply chains (HSC) (e.g., Figure. 1) by strategically locating critical facilities in low-risk areas is crucial in building disaster resilience in the Philippines. Logistics serve two primary functions in the whole process of disaster risk reduction and management: 1) it is responsible for providing the needed resources and equipment for all operating units during disaster response, and 2) it guarantees the speedy recovery and rehabilitation of affected areas and population by ensuring the smooth flow of materials and other needs in the area of operation. Left exposed to natural hazards, damage to logistics facilities may have cascading effects within the HSC that may hamper the adequate flow of goods, services, and information from supply to where it is needed, exacerbating and potentially prolonging the suffering of affected populations (UP SURP, 2016). This paper examines the exposure of Tacloban's HSC to hydrometeorological hazards and sea-level rise towards improving service continuity through infrastructure resilience.

2. Study Area Situationer

Haiyan, which entered the Philippine Area of Responsibility (PAR) in November 2013, is considered the worst typhoon to ever hit the country in terms of damage to properties in the history of the Philippines. The National Disaster Risk Reduction and Management Council (NDRRMC) reported that, upon landfall, until it exited the PAR in less than a day, it caused PhP 93 billion in damages to nine regions, spread across 44 provinces, around 600 municipalities, and 57 cities. The report indicated that around 16 million individuals were affected, while over 5.1 million were displaced by its onslaught. Approximately 6,300 individuals were reported dead, 28,688 were injured, and 1,062 were reported as missing. An estimated 550,928 houses were destroyed, while 589,404 were partially damaged. The total cost of damage to infrastructure was estimated at around PhP 10 billion. In contrast, damage to the social sector is pegged at PhP 43 billion, the productive sector lost PhP 24 billion, and the cross-sectoral damage is estimated at PhP 3 billion. Affected provinces also suffered from power outages as 1,959 transmission facilities, including backbone transmission lines, steel poles, and converter stations, were damaged during Haiyan. Water supply was reported to be rationed in localities where supply is limited (NDRRMC-OCD, 2013).

As the Eastern Visayas region's central trade, industry, and education hub, Tacloban City is a highly urbanized city comprising 17 rural and 121 urban barangays (PhilAtlas.com). With 42 of the City's 138 barangays have coasts and lowlands that are occupied mainly by informal settler families (NDRRMC-OCD, 2013; p. 22), reports indicated 58,432 units as damaged housing, with urban poor dwellings accounting for nearly a third of these structures. Because thousands of families were left homeless and without food, water, clothes, and other necessities, and as roads were impassable for several days, delaying the arrival and distribution of relief goods, dire circumstances forced people to ransack and loot almost all stores and warehouses in the City (NEDA, 2014; p. 34).

Funded by the Department of Science and Technology (DOST), a team of researchers from the University of the Philippines School of Urban and Regional Planning (UP SURP) reviewed the performance of the HSC in Tacloban City in 2015, hoping to prevent the same experiences as that of Haiyan from re-occurring. The study found that many areas in the province of Leyte were unable to access aid or were underserved due to the following: 1) damaged transport networks and communications, which delayed relief operations for days; 2) inadequate supply levels; 3) poorly coordinated delivery of relief supplies, especially during the last mile distribution, and 4) supplies wastage due to inadequate warehousing facilities (UP SURP, 2016).

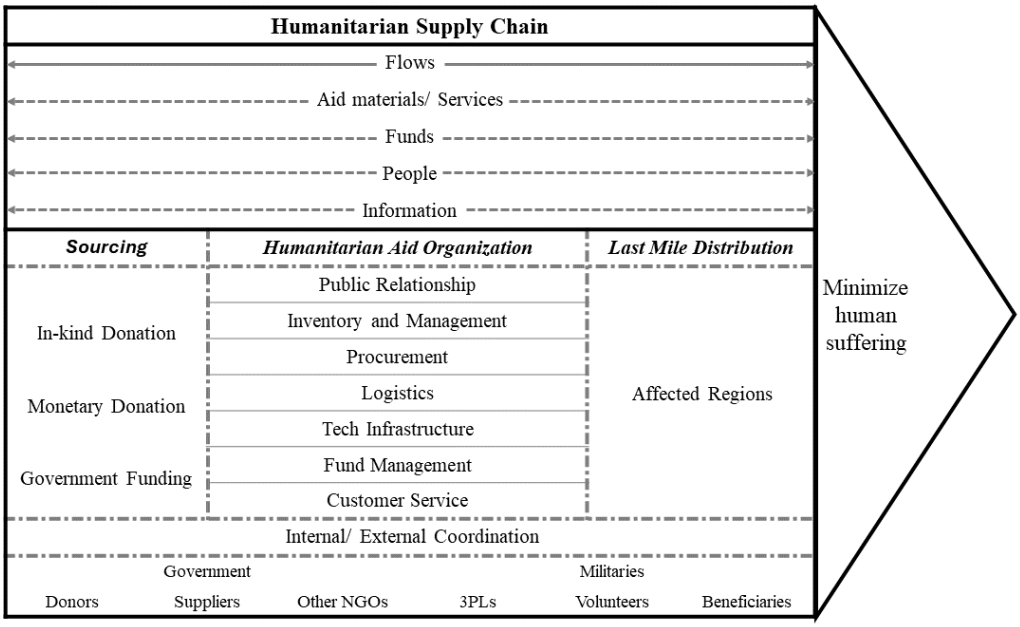

Figure 1. Framework for Humanitarian Supply Chain Management
Source: Yu et al., 2015

3. Methodology

Since local government units are mandated to serve as first disaster responders during disasters (RA 10121. Sec.15), they must be adequately equipped to carry out essential functions to meet the life preservation and basic subsistence needs of affected populations during disasters. On the other hand, the management of a HSC involves the integration and coordination of a large, dispersed group of experts to ensure the primary mission of humanitarian aid: "the delivery of products and services to the needy, whose immediate or long-term survival can depend on the efficient execution of operational activities of logistics and supply chain, including last mile distribution" (Argollo da Costa et al., 2012, p. 600). The effective and efficient performance of HSCs supports carrying out this essential function during disaster response as it enables the government, as the focal organization, to coordinate internally and with external actors and integrate various functions to respond to its constituent's needs. HSCs require the unhampered flow of goods and related information from the source to distribution until they reach their intended beneficiaries to alleviate suffering (Figure 1).

Public service continuity is defined as a public sector organization's capability to continue delivering services at acceptable predefined levels following a disruptive incident. This includes a wide range of emergencies, including localized acts of nature, accidents, and technological or attack-related emergencies. For government agencies to remain responsive and perform essential functions, there is a need to secure vital resources — all assets, people, skills, information, technology (including plant and equipment), premises, and supplies and information (whether electronic or not) that must be available to use when needed, to operate and meet its objective.

There is also a need to establish, implement, and maintain appropriate procedures for managing the immediate consequences of disruptive incidents (PDRF and NDRRMC 2020). Towards this end, it is crucial to understand how critical point facilities (CPFs) that provide essential socio-economic support services, such as schools, hospitals/rural health units, local government buildings, roads, bridges, air/ seaports, communication towers, and power-related and water-related facilities (HLURB, 2015) can be impacted by various hazards. To inform disaster response planning, this study focuses on conducting a risk assessment on the physical assets comprising the HSC to understand the nature of risk and its characteristics as well as its potential consequences for service delivery (Figure 2).

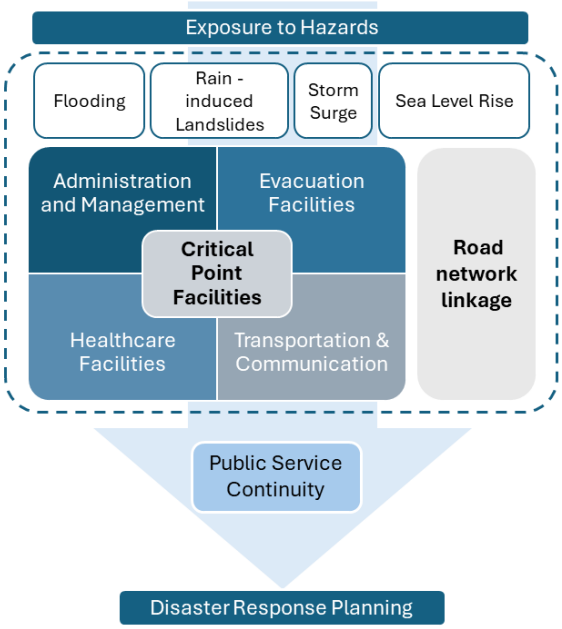

Figure 2. Conceptual Framework for the Study

The study examined the HSC infrastructure from the entry point (airports and seaports), circulation (roads and bridges), stockpiling (warehouses), and distribution (evacuation centers, barangay (village) halls, and hospitals) using a georeferenced inventory of facilities (Table 1). Based on this premise, the first part of this study investigated the exposure of critical point facilities and road networks to various hydro-meteorological risks and sea-level rise through geospatial analysis. The road network included routes to and from the entry point of goods to the warehouses where these are processed and stored (distribution hubs) for eventual distribution to barangay (village) halls, evacuation centers, and, in the case of medical supplies, to healthcare facilities (distribution outlets) where affected populations may access these. Hence, the road network considered all primary, secondary, and tertiary or residential roads in the study area.

Table 1. Inventory of Critical Point Facilities

Type	No.
Health Care Facilities	
Hospitals	1
District Health Centers	13
Barangay Health Stations	0
Total	14
Evacuation Facilities	
Evacuation Centers	0
Schools	113
Recreational Buildings	72
Churches	33
Day Care Centers	37
Total	254
Administration and Management	
Social Welfare Offices	9
Senior Citizen Center	1
Government Buildings	141
Protection Services Facilities	11
Storage (Warehouses)	*2*
Total	164
Transportation and Communications	
Transportation Terminals	5
Seaport	1
Airport	1
Fuel Station	21
Communication Facilities	9
Total	37
Total number of CPFs	**469**

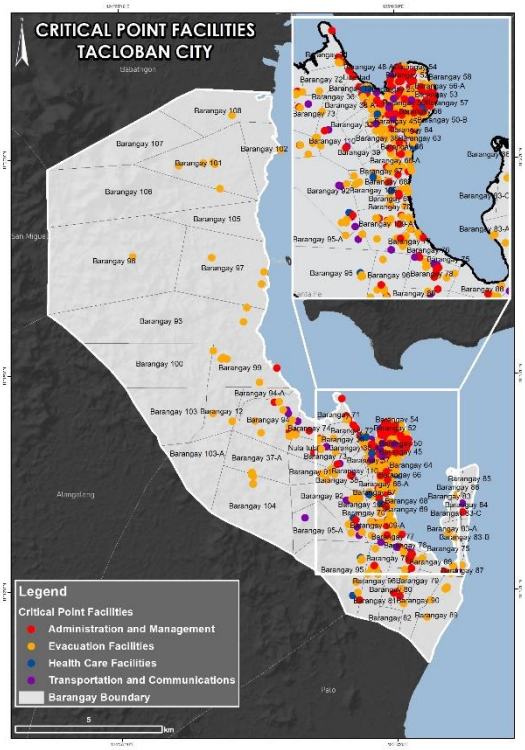

Figure 3. Critical Point Facilities Map

Tacloban City's CPFs (Table 1 and Figure. 3) and road network linkages (Figure 4) were examined for exposure to the following hazards: (a) sea-level rise (Figure 5), (b) flooding (Figure 6), (c) rain-induced landslide (Figure 7), and (d) storm surge (Figure 8) using geospatial and raster analysis to determine the extent of these hazards' effect on the system. The hazard data were based on the following assumptions: (a) 100-year-rain return for flood hazard, (b) 5.00m maximum tide of height for storm surge, and (c) 1.50m maximum height for sea-level rise. The study also investigated the effects of combined hazards on these physical assets (Figure 9). The hydro-meteorological hazard maps were from the Nationwide Operational Assessment of Hazards (NOAH) Center of the University of the Philippines (UP). The land use data was derived from existing land use maps in the City's draft Comprehensive Land Use Plan (CLUP) 2012, supplemented by secondary data sources like maps, documents, and reports from the local planning office. The road network data was derived from OpenStreetMap (OSM). The study used the process for exposure analysis contained in the Housing and Land Use Regulatory Board's (HLURB) Supplemental Guidelines on Mainstreaming Climate Change and Disaster Risks in the Comprehensive Land Use Plans (2015) to identify the potential impacts and the spatial manifestations of climate change concerning the HSC assets.

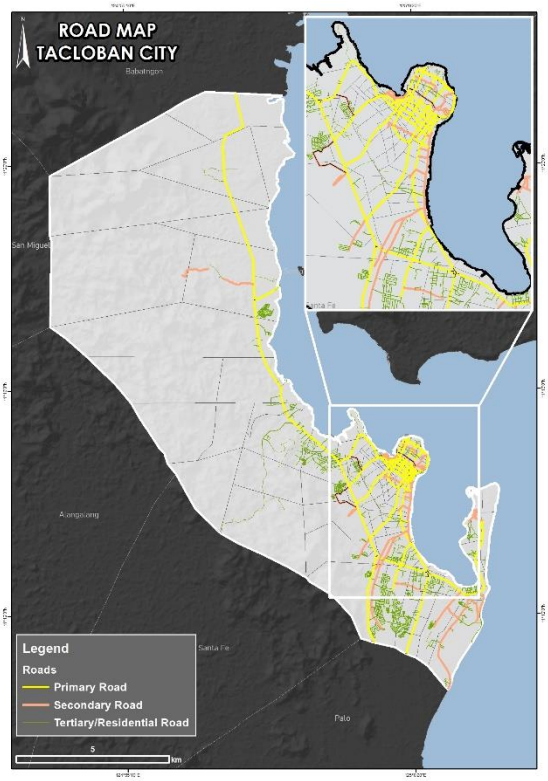

Figure 4. Road Network Map

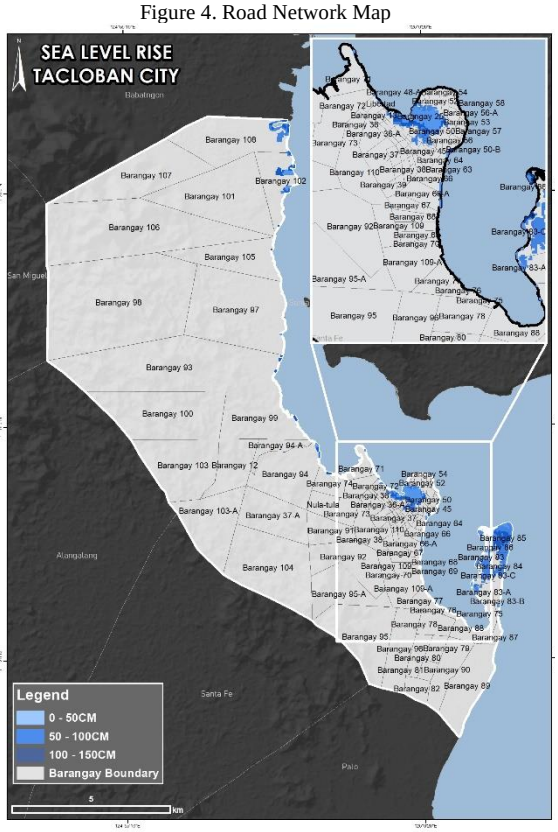

Figure 5. Sea Level Rise Map

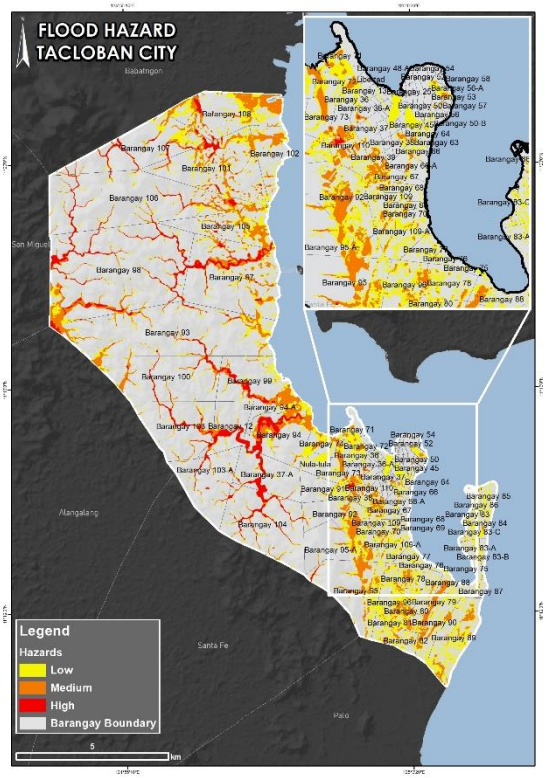

Figure 6. Flood Hazard Map

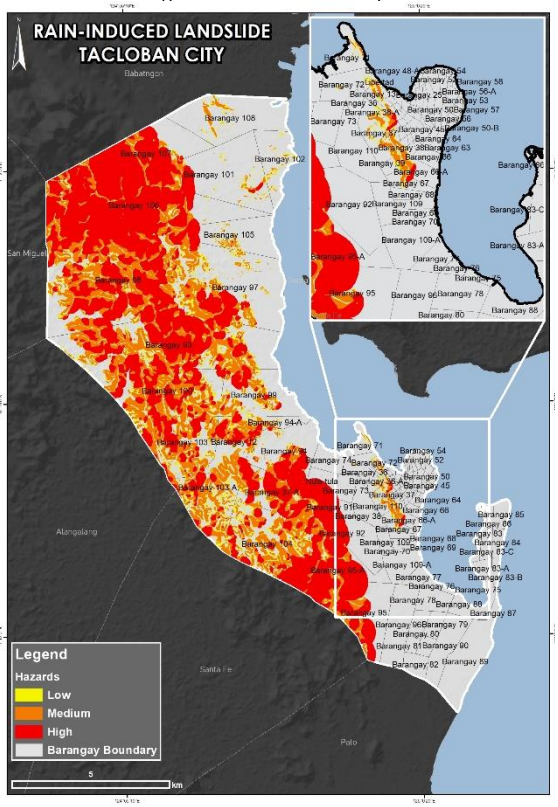

Figure 7. Rain-induced Landslide Hazard Map

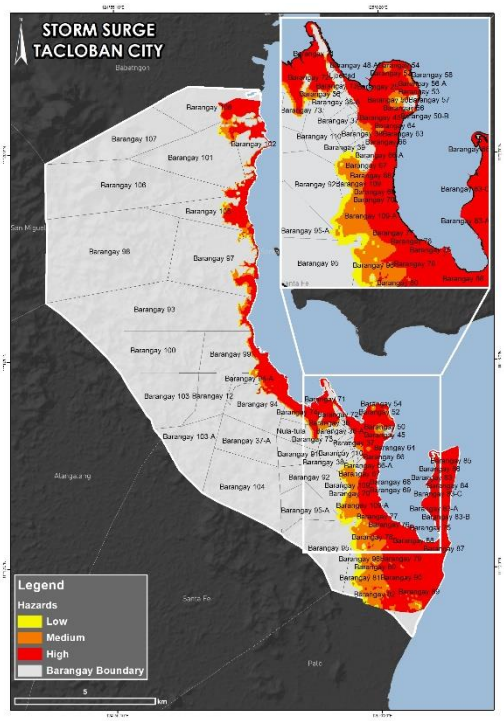

Figure 8. Storm Surge Hazard Map

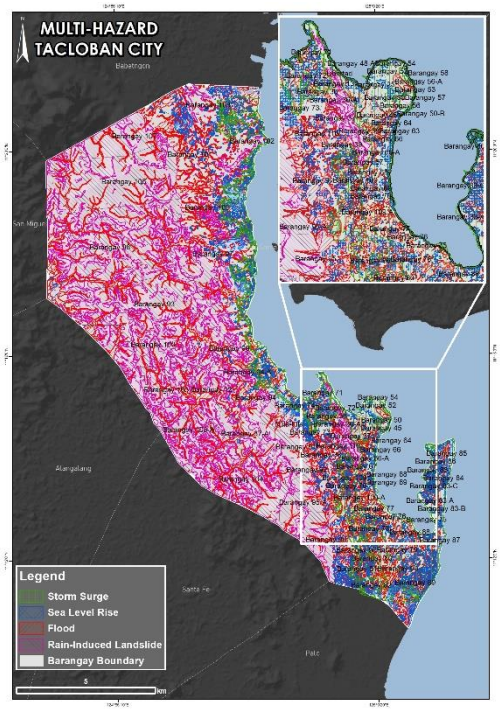

Figure 9. Multi-hazard Map

The second part of the study identified suitable areas for consideration in relocating critical point facilities using Geographic Information Systems (GIS) through a conjunctive multi-criteria decision analysis (MCDA) technique. This type of GIS overlay analysis is risk-averse and only accepts alternatives if they meet a cut-off value on every criterion (Greene et al., 2011). The overlay analysis was carried out on two levels to ensure that the lands identified are hazard-free and that no land-use conflicts exist among the potential sites.

The Potentially Suitable Areas were derived by subtracting hazard-prone areas from the territory (Figure 10). The Environmentally Suitable Areas were derived by further removing areas tagged as forest zones, protected areas, steeply sloping areas, environmentally sensitive areas, built-up areas, and Strategic Agricultural and Fisheries Zones (SAFDZ) (Figure 11).

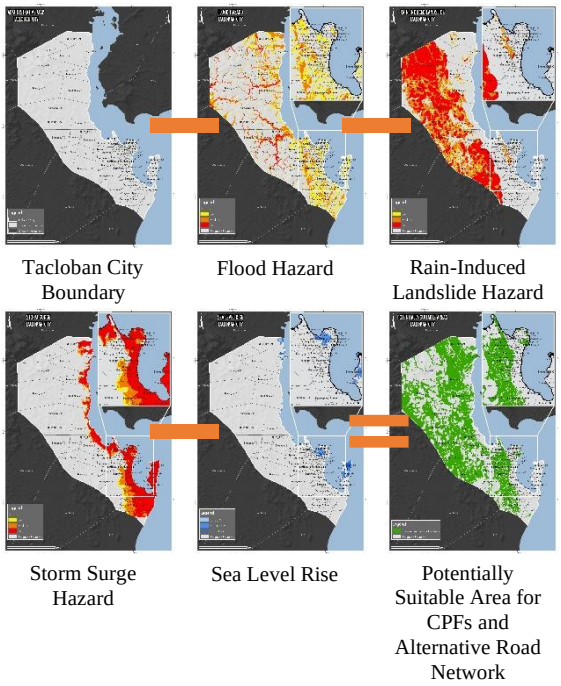

Figure 10. Illustration of the Process Used to Determine Potentially Suitable Land for Locating CPFs and Alternative Road Networks using GIS

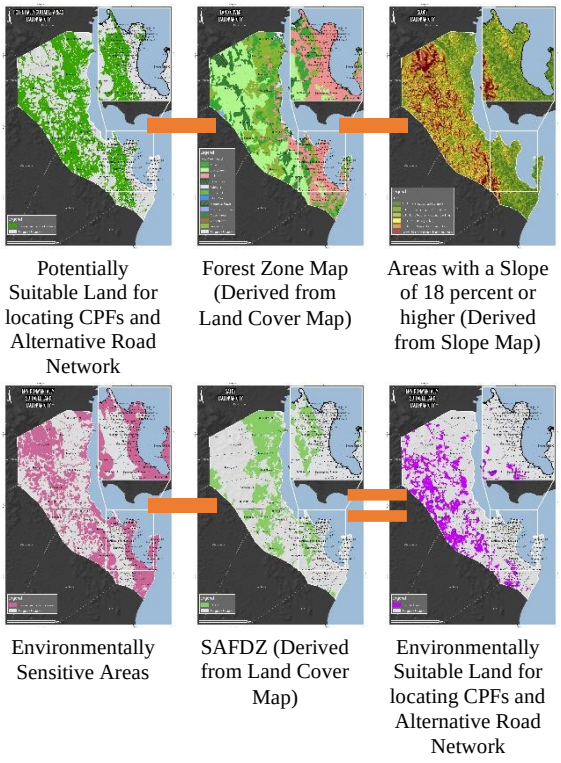

Figure 11. Illustration of the Process Used to Determine Environmentally Suitable Land for Locating CPFs and Alternative Road Networks using GIS

4. Results and Discussion

Tacloban City has a total land area of 20,172 hectares. Ranging from low to high exposure, it was found that flooding will likely affect 11.82 percent of its land area, while storm surges will affect 11.39 percent of its land area. On the other hand, rain-induced landslides will likely affect 25.01 percent of its land area. Sea level rise, indicated as a) 0-50 cm as low, b) 50-100 cm as moderate, and c) 1.00-1.5m as high risk, will affect none under the low scenario, less than one percent under the moderate scenario; and over 11 percent under the high scenario. Areas prone to multi-hazard account for 40.13 percent of Tacloban City's land area (Table 2).

Table 2. Land Area Affected per Hazard

Categories	Low *(has)*	Moderate *(has)*	High *(has)*
Flood	1,175.20 *(5.83%)*	908.00 *(4.50%)*	301.70 *(1.50%)*
Storm Surge	154.30 *(0.76%)*	488.00 *(2.42%)*	1655.00 *(8.20%)*
Rain induced Landslide	449.20 *(2.23%)*	1,760.10 *(8.73%)*	2,835.90 *(14.06%)*
Sea Level Rise	0.00 *(0 %)*	17.24 *(0.09%)*	2,246.48 *(11.14%)*
Multi-hazard	944.30 *(4.68%)*	2,617.90 *(12.98%)*	4,532.30 (22.47%)

4.1 Critical Point Facilities Exposure to Various Hazards

The review of HSC included 469 facilities, which were examined for their vulnerability to various hazards. These facilities included telecommunication facilities crucial to maintaining a constant flow of information, as well as transportation-related facilities like fuel stations, transport terminals, and ports. The study revealed that 64.11 percent of all these facilities are in areas highly susceptible to various hazards (Table 3).

4.1.1 Sea Level Rise (SLR)

According to the Department of Environment and Natural Resources-Land Management Bureau, the Philippines has a highly irregular coastline that spans 36,289 kilometers, making it one of the top eight countries likely to be affected by rising sea levels. A recent study suggests that the country may experience a five- to ten-fold increase in populations estimated to be below the projected high tide line. The study also indicates that the government will likely face more frequent coastal flooding due to rising sea levels (Kulp & Strauss, 2019). In 2015, the International Development Research Centre (IDRC) reported that, on average, sea levels around the world rise 3.10 cm every ten years, with SLR in the Philippines projected to increase between 7.6 and 10.2 cm each decade. The study assumes that sea-level rise hazards are classified into three categories: low risk (0-50 cm), moderate risk (50-100 cm), and high risk (100-150 cm). A significant portion of Tacloban City's highly developed urban area is located on the shore, making it vulnerable to coastal flooding due to sea-level rise.

A preliminary SLR assessment of Tacloban City using Climate Central's Coastal Risk Screening Tool — an interactive map showing areas threatened by sea level rise and coastal flooding using high-resolution airborne lidar data (Climate Central, 2020), suggests that despite the city's relatively high altitude, with most of its terrain exceeding 1.00 m in height, Tacloban may still face coastal inundation when the sea-level rise reaches 50 cm. While this initial review indicates that sea-level rise may impact less than 10 percent of the city's critical facilities, it can affect the Tacloban Airport— a vital entry point for aid workers and other forms of support into the city as well as the Tacloban City Astrodome (Table 3).

Table 3. Critical Point Facilities Exposure to Sea Level Rise

Categories	Number	SLR Low (0-50 cm)	SLR Moderate (50-100 cm)	SLR High (100-150 cm)
Administration & Management	164	6 *(3.66%)*	8 *(4.88%)*	18 *(10.98%)*
Evacuation Facilities	254	5 *(1.97%)*	12 *(4.72%)*	19 *(7.48%)*
Health Care Facilities	14	0 *(0 %)*	0 *(0 %)*	1 *(7.14%)*
Transportation & Communications Facilities	37	1 *(2.70%)*	3 *(8.11%)*	4 *(10.81%)*
Total	469	12 *(2.56%*	23 *(4.90%)*	42 *(8.96%)*

4.1.2 Flooding

The analysis found that 1) more than 25 percent of the 469 CPFs in the study area are low, 2) 5.35 percent are moderate, and 3) 1.50 percent have high exposure to flooding. By category, a) 28.05 percent of the facilities under the administration and management cluster; b) 35.03 percent of the evacuation facilities; c) 42.85 percent of healthcare facilities; and d) 32.44 percent of transportation and communications facilities are at varying levels of exposure to flooding (Table 4).

Table 4. Critical Point Facilities' Exposure to Flooding

Categories	Number	Low	Moderate	High
Administration & Management	164	38 *(23.17%)*	6 *(3.66%)*	2 *(1.22%)*
Evacuation Facilities	254	68 *(26.77%)*	17 *(6.69%)*	4 *(1.57%)*
Health Care Facilities	14	5 *(35.71%)*	0 *(0 %)*	1 *(7.14%)*
Transportation & Communications Facilities	37	10 *(27.03%)*	2 *(5.41%)*	0 *(0 %)*
Total	469	121 *(25.80%)*	25 *(5.35%)*	7 *(1.50%)*

4.1.3 Rain-Induced Landslides (RIL)

The study found that about 1) 25.59 percent of the CPFs are at low, 2) 5.33 percent are at moderate, and 3) 1.49 percent are at high exposure to rain-induced landslides. By category, a) 27.44 percent of the facilities of the administration and management cluster; b) 35.04 percent of the facilities of the evacuation facilities; c) 42.86 percent of healthcare facilities; and d) 32.43 percent of transportation and communications facilities are at varying levels of exposure to RIL (Table 5).

Table 5. Critical Point Facilities Exposure to Rain-Induced Landslides (RIL)

Categories	Number	Low	Moderate	High
Administration & Management	164	37 *(22.56%)*	6 *(3.66%)*	2 *(1.22%)*
Evacuation Facilities	254	68 *(26.77%)*	17 *(6.69%)*	4 *(1.57%)*
Health Care Facilities	14	5 *(35.71%)*	0 *(0 %)*	1 *(7.14%)*
Transportation & Communications Facilities	37	10 *(27.03%)*	2 *(5.41%)*	0 *(0 %)*
Total	469	120 *(25.70%)*	25 *(5.33%)*	7 *(1.49%)*

4.1.4 Storm Surge

Tacloban City's CPFs are threatened by storm surge exposure, with 1) 2.35 percent found at low, 2) 13.43 percent at moderate, and 3) 53.73 percent at high. Almost 70 percent of these HSC facilities are exposed in various levels: a) 60.9 percent of the administration and management cluster, b) 74.02 percent of the facilities of the evacuation facilities, c) 57.14 percent of healthcare facilities; and d) 81.08 percent of transportation and communications facilities are at varying levels of exposure to storm surge (Table 6).

Table 6. Critical Point Facilities' Exposure to Storm Surge

Categories	Number	Low	Moderate	High
Administration & Management	164	4 *(2.44%)*	19 *(11.59%)*	79 *(48.17%)*
Evacuation Facilities	254	7 *(2.76%)*	36 *(14.17%)*	145 *(57.09%)*
Health Care Facilities	14	0 *(0 %)*	2 *(14.29%)*	6 *(42.86%)*
Transportation & Communications Facilities	37	0 *(0 %)*	6 *(16.22%)*	24 *(64.86%)*
Total	469	11 *(2.35%)*	63 *(13.43%)*	254 (54.16%)

4.1.5 Exposure to Multi-Hazards

Over 76 percent of Tacloban City's critical point facilities are exposed to combined hydro-meteorological risks of flooding, rain-induced landslides, storm surge, and sea-level rise; 1) 5.97 percent at low, 2) 15.99 percent at moderate, and 3) 54.80 percent at high. By category, a) 59.76 percent of the administration and management cluster, b) 87.01 percent of the facilities of evacuation facilities, c) 71.43 percent of healthcare facilities, and d) 83.78 percent of transportation and communications facilities are at varying levels of multi-hazard exposure (Table 7).

Table 7. Critical Point Facilities Exposure to Multi-Hazards

Categories	Number	Low	Moderate	High
Administration & Management	164	7 *(4.27%)*	22 *(13.41%)*	71 *(42.77%)*
Evacuation Facilities	254	20 *(7.87%)*	44 *(17.32%)*	157 *(61.81%)*
Health Care Facilities	14	1 *(7.14%)*	2 *(14.29%)*	7 *(50.00%)*
Transportation & Communications Facilities	37	0 *(0.00%)*	7 *(18.92%)*	24 *(64.86%)*
Total	469	28 *(5.97%)*	75 *(15.99%)*	257 *(54.80%)*

4.2 Hazard Exposure of Road Networks Linking the HSC

Tacloban City Port (Main Hub) is Leyte's entry point for aid provisions. These goods are transferred to the following Distribution Hubs: a) Tacloban City Astrodome and b) Department of Social Welfare and Development (DSWD) Warehouse for further processing or repacking, as needed, before being sent to the various Distribution Outlets. The study traced the flow of goods through network analysis from the Main Hub to the Distribution Hubs and then to: a) 254 evacuation centers for food and non-food items, and b) 14 healthcare facilities in the case of medical supplies and equipment, where beneficiaries gain access to aid (see HSC routes in Table 8, Figures 10, 11, 12 and 13).

Table 8. Humanitarian Supply Chain (HSC) Routes

From	To	Number of Routes	Total Length
Tacloban City Port (Main Hub)	Tacloban City Astrodome (Distribution Hub 1)	1	3.17 km
	DSWD Warehouse (Distribution Hub 2)	1	2.43 km
Tacloban City Astrodome (Distribution Hub 1)	Evacuation Centers	113	483.07 km
	Barangay Halls	80	207.51 km
	Healthcare Facilities	14	37.59 km
DWSD Warehouse (Distribution Hub 2)	Evacuation Centers	111	459.43 km
	Barangay Halls	80	196.61 km
	Healthcare Facilities	13	37.69 km

A network analysis was likewise conducted to determine which parts of 469 HSC routes would be affected by various hazards. All paths linking these facilities together were included in the analysis. Out of the 2,445.80 km of roads in Tacloban City, 1,427.50 km of roads comprising the humanitarian supply chain network were overlaid onto the hazard maps to determine the extent of its exposure to various climate-related hazards (Figures. 12, 13, 14, and 15).

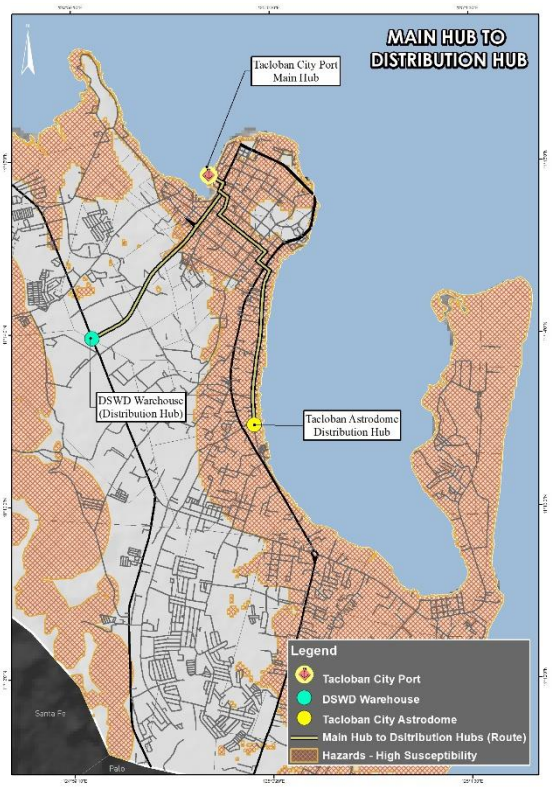

Figure 12. Multi-hazard Analysis of the Main Hub to Distribution Hub Route Map

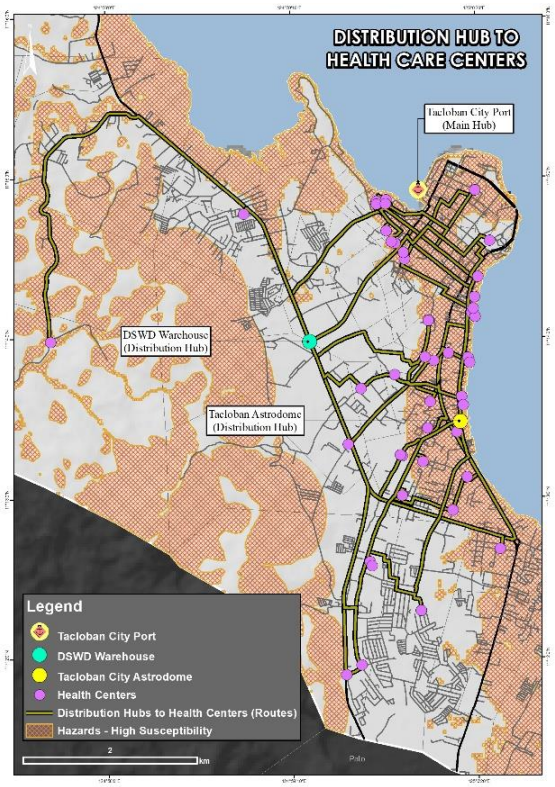

Figure 14. Multi-hazard Analysis of the Distribution Hub to Healthcare Centers Route Map

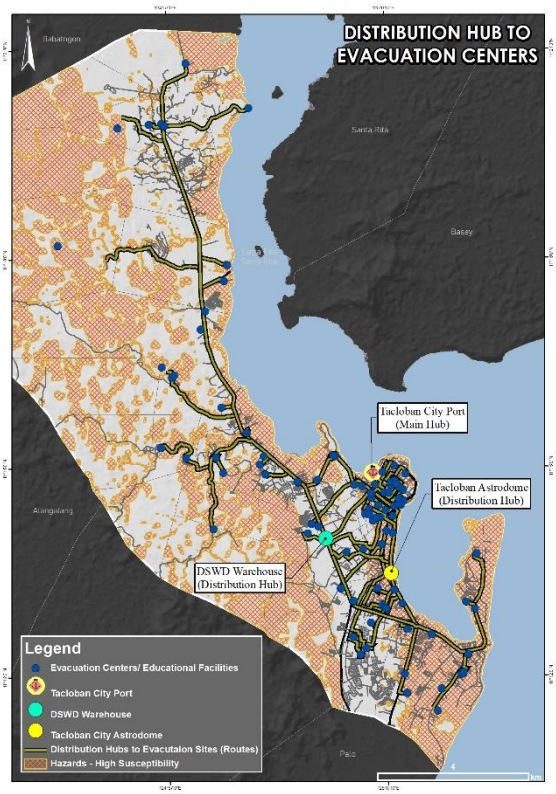

Figure 13. Multi-hazard Analysis of the Distribution Hub to Evacuation Centers

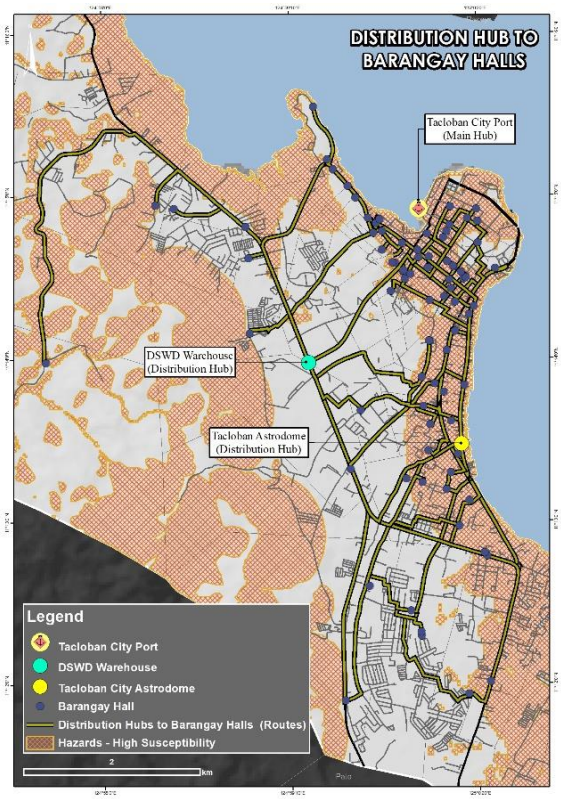

Figure 15. Multi-hazard Analysis of the Distribution Hub to Barangay Halls Route Map

The study found that a) 226.41 km is exposed to flooding, b) 352.87 km is exposed to storm surge, c) 27.79 km is exposed to rain-induced landslides, d) 27.79 km is exposed to sea-level rise, while e) 468.58 km is exposed to multi-hazards. When combined, 1114.94 km, about 78 percent of the routes identified in the study are exposed to various hazards (Table 9).

Table 9. HSC Routes Exposure to Various Hazards

Categories	Low (km)	Moderate (km)	High (km)	Total (km)
Flood	167.64	52.14	6.63	*226.41*
Storm Surge	33.62	98.24	221.01	*352.87*
Rain-induced Landslide	3.84	4.40	19.55	*27.79*
Sea Level Rise	7.45	11.57	20.27	*39.29*
Multi-hazards	93.80	124.2	250.49	*468.49*

4.3 Implications of Exposure Analysis to Humanitarian Supply Chain Facilities Planning

In line with the SFDRR 2015 – 2030 outcome on "preventing new and reducing existing disaster risks through the implementation of integrated and inclusive… measures that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery, and thus strengthen resilience" prevention and mitigation is one of the pillars supporting the National Disaster Risk Reduction and Management Plan (NDRRMP) 2011-2028 vision for the country of "safer, adaptive and disaster resilient Filipino communities toward sustainable development." Avoiding hazards and mitigating their potential impacts requires a proactive understanding of hazards, risks, and vulnerabilities of population, assets, and the environment and factoring in climate and disaster risk assessment information into planning, investment, and development decisions (HLURB, 2015).

RA 10121, known as the Philippine Disaster Risk Reduction and Management Act of 2010, mandates government agencies to continue their operations and essential functions regardless of any disaster to provide "maximum care, assistance, and services to individuals and families affected by disaster, implement emergency rehabilitation projects to lessen the impact of a disaster and facilitate the resumption of normal social and economic activities" (Sec.2 (p)). The study provides an understanding of the hazard exposure of Tacloban City's HSCs. Per the review, more than 76 percent of the critical point facilities and more than 78 percent of the routes linking these are in areas highly exposed to multiple hazards (Figure 16). The Tacloban City Port, which serves as the entry point for aid provisions in Leyte, as well as the Tacloban City Astrodome, which serves as one of the two Distribution Hubs, are also situated along the coast that is at high-risk exposure to multiple hazards. Tacloban Airport is exposed to the threats of SLR along with other facilities located on the coast. Substantial portions of the routes connecting the Distribution Hubs to the Evacuation Facilities, Health Care Facilities, and Barangay Halls are also exposed to various threats. The findings on the exposure of the physical assets comprising Tacloban's HSC validate the findings of previous studies and existing literature on damages incurred during Haiyan. The study puts forward the following recommendations to prevent future service delivery disruptions.

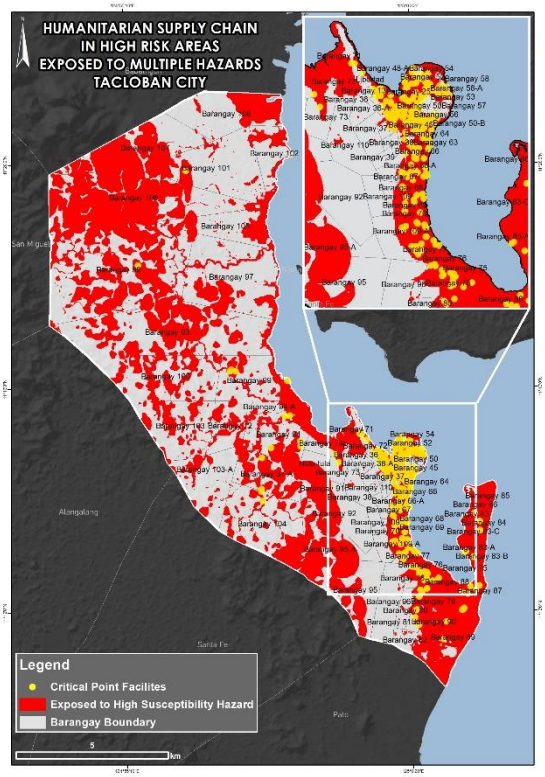

Figure 16. Elements of the Humanitarian Supply Chain in high-risk areas exposed to multiple hazards

4.3.1 Loss and Damage Prevention Through Decentralization

The study findings suggest the need for appropriate and safe sites for stockpiling and storing emergency supplies and essential goods to avoid resource waste. As much as possible, critical hubs should be placed in low-risk areas accessible to roads and thoroughfares that link them to various distribution outlets. Establishing distribution hubs outside the city's already densely built-up coastal area and having decentralized storage facilities may lessen the chance of considerable losses in a single event.

4.3.2 Facilities Strengthening

The exposure analysis results also suggest that in most cases, selecting a site that may be exposed to some degree to various hazards may be unavoidable. In such cases, planners must consider adopting parameters that increase these critical facilities' resilience during the conceptualization, design, planning, construction, and operation phases. Aside from complying with relevant codes, performance-based standards may provide an additional safety measure in these CPFs to improve their performance.

4.3.3 Redundancy

To achieve a resilient humanitarian supply chain, the findings in the study indicate the need to plan for redundancy in the development of critical infrastructure. Redundancies are alternative facilities that may be substituted in cases where one or more facilities are unusable. If a significant entry point, such as an airport, is destroyed, a different airport can readily take its place. Likewise, alternative routes to facilitate unimpeded movement between the distribution hubs, evacuation centers, and other critical point facilities will be vital in times of crisis.

The study emphasizes the need to keep emergency routes linking these facilities clear for unimpeded movement of goods between various facilities comprising the HSC. Since 78 percent of the routes identified in the study are exposed to various hazards, there may be a need to develop alternative routes and identify other possible means of transporting goods at the last mile. Since existing transportation facilities are highly exposed to various hazards, care must be taken to ensure that transportation facilities tagged for use during disaster response are relocated to hazard-free areas to ensure mobility.

4.4 Risk-informed Site Selection: a vital step toward making humanitarian supply chains resilient.

Judicious site selection plays a crucial role in ensuring the performance of the HSC. A conjunctive multi-criteria decision analysis using GIS was carried out in a two-step process to determine suitable locations for CPFs and possible alternative routes. A cursory approach removed all hazard-prone areas in the selection process, which yielded Potentially Suitable Areas for consideration (Figure 17). Spread out in 97 out of 138 barangays, these potentially suitable areas account for 5,738.09 hectares of the total area in Tacloban City. To ensure that the new areas where the HSC facilities may be constructed will not encroach on lands that are earmarked for protection or productive uses, the second GIS overlay excluded the following land uses and characteristics from the potentially suitable areas: (1) forest zones, (2) protected areas, (3) areas where the slope exceeds 18 degrees (steep slopes) (4) environmentally sensitive areas, (5) built-up areas, (6) Strategic Agricultural and Fisheries Zones, (SAFDZ) which yielded 2,541.92 hectares of Environmentally Suitable Areas (Figure 18) spread out in 36 barangays.

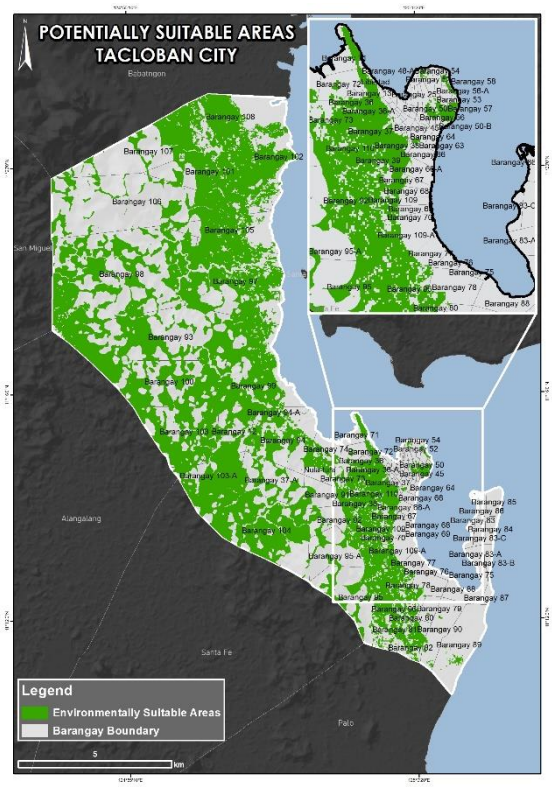

Figure 17. Potentially Suitable Areas for Locating CFPs and Alternative Road Network

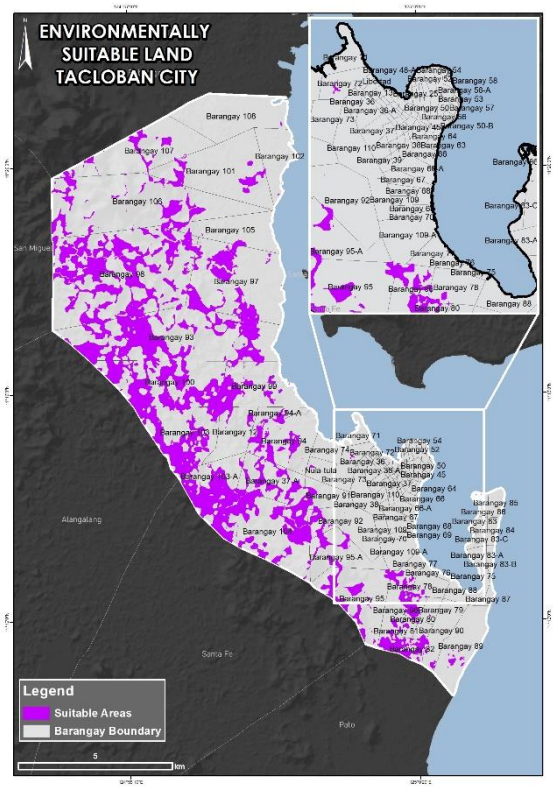

Figure 18. Environmentally Suitable Areas for Locating CPFs and Alternative Road Network

5. Conclusion

Amidst our fast-changing environment, the interdependency and complexity of risk drivers demand that we examine our urban centers as "systems of systems" in which a threat in one system will likely affect others. While UNDRR (2019) recognizes the inadequacy of current risk measurement and management approaches to meet the challenges of "multifaceted interconnectedness of hazard, as well as the barely understood breadth of exposure, and the profound detail of vulnerability" (p. iv), it also notes the urgency of reducing risks by avoiding decisions that create risk, by reducing existing risk, and by building resilience (p. xii) (UNDRR, 2019). This study illustrates how the conduct of exposure analysis of HSC assets to various climate-related hazards can provide decision-makers with a risk-informed decision-support tool that can support local governments' resilience to disaster risks in three ways: (1) understand risk reduction options, (2) facilitate wiser investment decisions, and (3) build more safely, with due recognition of the relevance of priority services and operations being carried out in these facilities before, during, and after a disaster (UNDRR, 2019). An evidence-based approach like the one used in this study can help ensure that taxpayer's money is invested in life-saving facilities that are not just efficient and cost-effective to construct, operate, and maintain but are also resilient to shocks and disruptions, starting from the very decision on where it is built.

6. Recommendations for Further Studies

Recent policy issuances by the Philippine National Government mandate local government units to utilize part of their Local Disaster Risk Reduction and Management Fund (LDRRMF) for disaster prevention and mitigation activities, including the conduct of risk assessment and vulnerability analysis for critical facilities and infrastructure (NDRRMC, 2013). Furthermore, guidelines on the development of resilient evacuation centers specifically require that the selection of construction sites for these facilities take into consideration the most recent risk assessments to ensure that these are not located in unsafe locations prone to natural and man-made hazards (Sec. 5.1.1.1), and to ensure year-round vehicular access to these facilities, especially before, during, and after a hazard event (Sec. 5.1.1.4) (DILG, 2018). To facilitate a robust process of selecting suitable sites for public facilities, the process described herein can be combined with cadastral information to determine viable sites for possible acquisition.

The study is limited to understanding the hazards facing various elements comprising Tacloban City's HSCs. Researchers are encouraged to evaluate the vulnerability of these facilities to various hazards by incorporating information on the condition of facilities, type of construction, and year of construction, among others, to determine other mitigation measures. To deepen the site selection process, parcel-level information on land classification, zoning assessment, tenure, and ownership, among others, that can support investment decisions may be included in the MCDA.

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