

Turnitin Originality Report

Processed on: 14-Mar-2022 1:01 PM WIB
ID: 1783824270
Word Count: 12302
Submitted: 1

Similarity Index	Similarity by Source
15%	Internet Sources: N/A Publications: 15% Student Papers: N/A

Old Semarang City the sustainability of traditional city patterns in Java By Muhammad Abdullah

1% match (publications) "Urban and Transit Planning", Springer Science and Business Media LLC, 2020
1% match (publications) Jianwen Zheng, Qiuhua Tao, Li Li. "Numerical study of wind environment of a low-rise building with shading louvers: sensitive analysis and evaluation of cross ventilation", Journal of Asian Architecture and Building Engineering, 2020
1% match (publications) Hyungkyoo Kim, Dongwook Sohn. "The urban built environment and the mobility of people with visual impairments: analysing the travel behaviours based on mobile phone data", Journal of Asian Architecture and Building Engineering, 2020
< 1% match (publications) "Urban and Transit Planning", Springer Science and Business Media LLC, 2020
< 1% match (publications) Setiadi David Utama. "A Study of Historical Transformation of North Coastal Cities in Java", Journal of Asian Architecture and Building Engineering, 2018
< 1% match (publications) R. Siti Rukayah, Bharoto, Abdul Malik. "Between Colonial, Moslem, and Post-Independence Era, Which Layer of Urban Patterns should be Conserved?", Procedia - Social and Behavioral Sciences, 2012
< 1% match (publications) Jader Joel Machado Junqueira. "Avaliação dos efeitos do tabagismo no metabolismo ósseo em modelo experimental de doença pulmonar obstrutiva crônica", Universidade de Sao Paulo, Agencia USP de Gestao da Informacao Academica (AGUIA), 2021
< 1% match (publications) A Marlina. "What are the most enduring elements in the traditional city of Surakarta? A case study of Kampong Baluwarti within the Surakarta Sunanate Palace", IOP Conference Series: Earth and Environmental Science, 2020
< 1% match (publications) Endy Agustian, Rini Rachmawati, R. Rijanta, Agus Joko Pitoyo. "Multi-ethnic Settlement Concept in Denpasar City, Bali, Indonesia", Journal of Physics: Conference Series, 2020
< 1% match (publications) Ahmed A. Al-Jaberi, Ahmed S. Al Al-Khafaji, Nadia A. Al-Salam, Tuqa R. Alrobaee. "The Crossing as a New Approach for the Urban Transformation of Traditional Cities Towards the Sustainability", International Journal of Sustainable Development and Planning, 2021
< 1% match (publications) Tirta Nugraha Mursitama, Yi Ying. "Indonesia's Perception and Strategy toward China's OBOR Expansion: Hedging with Balancing", The Chinese Economy, 2020
< 1% match (publications) R.I. Ogie, C. Adam, P. Perez. "A review of structural approach to flood management in coastal megacities of developing nations: current research and future directions", Journal of Environmental Planning and Management, 2019
< 1% match (publications) Djamel Boussaa. "Urban Regeneration and the Search for Identity in Historic Cities", Sustainability, 2017

<p>< 1% match (publications)</p> <p>Inho Yang. "Optimization of operation times of a heating system in office building". Journal of Asian Architecture and Building Engineering, 2020</p>
<p>< 1% match (publications)</p> <p>James F. Osborne. "Ancient cities and power: the archaeology of urbanism in the Iron Age capitals of northern Mesopotamia", International Journal of Urban Sciences, 2015</p>
<p>< 1% match (publications)</p> <p>Meng Zhen, Qi Dong, Ping Chen, Wei Ding, Dian Zhou, Wei Feng. "Urban outdoor thermal comfort in western China", Journal of Asian Architecture and Building Engineering, 2020</p>
<p>< 1% match (publications)</p> <p>Lisa-Michéle Bott, Boris Braun. "How do households respond to coastal hazards? A framework for accommodating strategies using the example of Semarang Bay, Indonesia", International Journal of Disaster Risk Reduction, 2019</p>
<p>< 1% match (publications)</p> <p>Nir Mualam, Rachele Alterman. "Architecture is not everything: a multi-faceted conceptual framework for evaluating heritage protection policies and disputes", International Journal of Cultural Policy, 2018</p>
<p>< 1% match (publications)</p> <p>R S Rukayah, A B Sardjono, M Abdullah, R Yulichandra. "Measuring land subsidence of buildings in Semarang Chinatown", IOP Conference Series: Earth and Environmental Science, 2021</p>
<p>< 1% match (publications)</p> <p>Sylvia Ang, Elaine Lynn-Ee Ho, Brenda S. A. Yeoh. "Migration and new racism beyond colour and the "West": co-ethnicity, intersectionality and postcoloniality", Ethnic and Racial Studies, 2022</p>
<p>< 1% match (publications)</p> <p>Kelsey Leonard. "WAMPUM Adaptation framework: eastern coastal Tribal Nations and sea level rise impacts on water security", Climate and Development, 2021</p>
<p>< 1% match (publications)</p> <p>Aka Mfoniso U., Ibuot Johnson C., Agbasi Okechukwu. "Integration of Seismic Refraction Tomography (SRT) and Electrical Resistivity Tomography (ERT) to Investigate the Effects of Landslide in Itu L. G. A., Akwa Ibom State, Southern Nigeria", Trends in Applied Sciences Research, 2020</p>
<p>< 1% match (publications)</p> <p>R. Siti Rukayah, Totok Roesmanto, Sukawi. "The Sustainability Concept of Alun-alun as a Model of Urban Design in the Future", Procedia - Social and Behavioral Sciences, 2013</p>
<p>< 1% match (publications)</p> <p>Ulla Hakala, Arja Lemmetyinen, Lenita Nieminen. "Rebranding a "rather strange, definitely unique" city via co-creation with its residents", Place Branding and Public Diplomacy, 2020</p>
<p>< 1% match (publications)</p> <p>Ali Keyvanfar, Arezou Shafaghat, Nurhaizah Ismail, Sapura Mohamad, Hamidah Ahmad. "Multifunctional retention pond for stormwater management: A decision-support model using Analytical Network Process (ANP) and Global Sensitivity Analysis (GSA)", Ecological Indicators, 2021</p>
<p>< 1% match (publications)</p> <p>D T Widyastuti. "Reinforcing identity: Bringing the new face of Malioboro Historic Place, Yogyakarta, Indonesia", IOP Conference Series: Earth and Environmental Science, 2020</p>
<p>< 1% match (publications)</p> <p>Edi Kurniawan, Erni Suharini, Muchamad Dafip. "How Far Disaster Management Implemented Toward Flood Preparedness: A Lesson Learn from Youth Participation Assessment in Indonesia", International Journal of Safety and Security Engineering, 2021</p>
<p>< 1% match (publications)</p> <p>Kristin Landau. "Spatial Logic and Maya City Planning: The Case for Cosmology", Cambridge Archaeological Journal, 2015</p>

<p>< 1% match (publications)</p> <p>Meydelin Isani Thoban, Dyah Rahmawati Hizbaron. "Urban resilience to floods in parts of Makassar, Indonesia", E3S Web of Conferences, 2020</p>
<p>< 1% match (publications)</p> <p>Edmond Manahasa, Odeta Manahasa. "Defining urban identity in a post-socialist turbulent context: The role of housing typologies and urban layers in Tirana", Habitat International, 2020</p>
<p>< 1% match (publications)</p> <p>D S Makmur, M Nur, K T Muda. "Preservation of underwater cultural heritage: utilization of Lockheed P-38 lightning aircraft in Lae-Lae Island waters as a diving attraction", IOP Conference Series: Earth and Environmental Science, 2020</p>
<p>< 1% match (publications)</p> <p>Emilio Garcia, Brenda Vale, Robert Vale. "Chapter 5 Technology and Collapse", Springer Science and Business Media LLC, 2021</p>
<p>< 1% match (publications)</p> <p>R. Siti Rukayah, Bharoto, Abdul Malik. "Cycle of Informal Traders, a Tradition that does not Require a Building from Practice-research-to Practice", Procedia - Social and Behavioral Sciences, 2013</p>
<p>< 1% match (publications)</p> <p>Kaoru Ueda, Sonny C. Wibisono, Naniek Harkantiningasih, Chen Sian Lim. "Chapter 12 Consumption of Chinese and European Ceramics at the Sultanate of Banten, Java, Indonesia from the Seventeenth to the Early Nineteenth Century: Material Culture of Early Globalism", Springer Science and Business Media LLC, 2016</p>
<p>< 1% match (publications)</p> <p>Ulla Hakala, Paula Sjöblom, Satu-Paivi Kantola. "Toponyms as carriers of heritage: implications for place branding", Journal of Product & Brand Management, 2015</p>
<p>< 1% match (publications)</p> <p>Weicheng Lo, Sanidhya Nika Purnomo, Bondan Galih Dewanto, Dwi Sarah, Sumiyanto. "Integration of Numerical Models and InSAR Techniques to Assess Land Subsidence Due to Excessive Groundwater Abstraction in the Coastal and Lowland Regions of Semarang City", Water, 2022</p>
<p>< 1% match (publications)</p> <p>Malak Alasli. "Hungarian place names from a Moroccan perspective", Proceedings of the ICA, 2021</p>
<p>< 1% match (publications)</p> <p>"Perception, Design and Ecology of the Built Environment", Springer Science and Business Media LLC, 2020</p>
<p>< 1% match (publications)</p> <p>Amber M van der Warker. "Field cultivation and tree management in tropical agriculture: a view from Gulf Coastal Mexico", World Archaeology, 2005</p>
<p>< 1% match (publications)</p> <p>R. Siti Rukayah, Ardiyan Adhi Wibowo, Sri Hartuti Wahyuningrum. "Public Participation in Branding Road Corridor as Shopping Window or Batik Industry at Pekalongan", Procedia - Social and Behavioral Sciences, 2015</p>
<p>< 1% match (publications)</p> <p>Sudharto P Hadi. "In Search for Sustainable Coastal Management: A Case Study of Semarang, Indonesia", IOP Conference Series: Earth and Environmental Science, 2017</p>
<p>< 1% match (publications)</p> <p>John N. Miksic. "Water, Urbanization, and Disease in Ancient Indonesia", Archeological Papers of the American Anthropological Association, 2008</p>
<p>< 1% match (publications)</p> <p>"A344 Block 2 Week 10 online study materials WEB065061 ", Open University</p>
<p>< 1% match (publications)</p> <p>Dwi Kurnia Sandy, Nur Izzatul Ulum. "Latar Belakang Pemilihan Tahuna Sebagai Pusat Ekonomi dan Politik Masa Hindia Belanda", Tumotowa, 2020</p>
<p>< 1% match (publications)</p>

N K A Siwalatri. "Learning from the non-technological foundation of a smart city: philosophy and its representations in the formation of urban attributes of Kota Cakranegara (Lombok)", IOP Conference Series: Earth and Environmental Science, 2021
< 1% match (publications) Dipa Nugraha, Suyitno. "ON THE BEGINNING OF MODERN INDONESIAN LITERATURE", Humanities & Social Sciences Reviews, 2019
< 1% match (publications) Freek Colombijn, Joost Côté. "Cars, Conduits, and Kampongs", Brill, 2015
< 1% match (publications) M. Sugeng Sholehuddin, Munjin Munjin, Hendri Hermawan Adinugraha. "Islamic Tradition and Religious Culture in Halal Tourism: Empirical Evidence from Indonesia", IBDA : Jurnal Kajian Islam dan Budaya, 2021
< 1% match (publications) Yanuar Rahman, Hendy Hertiasa. "Perancangan Permainan Digital "Kronik Majapahit" Sebagai Media Pembelajaran Sejarah Sumpah Palapa Untuk Remaja", Jurnal Bahasa Rupa, 2018
< 1% match (publications) Zaheer Allam, David Jones, Meelan Thondoo. "Cities and Climate Change", Springer Science and Business Media LLC, 2020
< 1% match (publications) Atsushi Ota. "Changes of Regime and Social Dynamics in West Java", Brill, 2006
< 1% match (publications) C Maulidi, W I Rukmi. "Literature Review on Spatial Order of Ancient Javanese Cultural Landscape: It May Contains Spatial Continuum Idea", IOP Conference Series: Earth and Environmental Science, 2019
< 1% match (publications) Charlie Qiuli Xue, Cong Sun, Lujia Zhang. "Grand theatres in China: a Mosaic analysis of database", Journal of Asian Architecture and Building Engineering, 2020
< 1% match (publications) S Amin, S E Pramono, G F Kurniawan. "Historical park of inclusive tourism development in Semarang", IOP Conference Series: Earth and Environmental Science, 2021
< 1% match (publications) Travis W Stanton, David A Freidel. "Placing the Centre, Centring the Place: the Influence of Formative Sacbeob in Classic Site Design at Yaxuná, Yucatán", Cambridge Archaeological Journal, 2005
< 1% match (publications) Dian Sulistyowati, Aldo W. Foe. "INDONESIA'S OWN 'PYRAMID': THE IMAGINED PAST AND NATIONALISM OF GUNUNG PADANG", International Review of Humanities Studies, 2021
< 1% match (publications) Laina Hilma Sari, Siti Zulfa Yuzni, Muhammad Haigal, Z Evalina. "A review of spatial comfort in shophouse in humid tropics", IOP Conference Series: Materials Science and Engineering, 2018
< 1% match (publications) Laurence Husson. "Eight Centuries of Madurese Migration to East Java", Asian and Pacific Migration Journal, 2016
< 1% match (publications) Nur Kafid. "Dari Islamisme ke "Premanisme": Pergeseran Orientasi Gerakan Kelompok Islam Radikal di Era Desentralisasi Demokrasi", MASYARAKAT: Jurnal Sosiologi, 2016
< 1% match (publications) Uray Fery Andi. "PENGARUH JARINGAN PERDAGANGAN GLOBAL PADA STRUKTUR WILAYAH DAN KONFIGURASI SPASIAL PUSAT PEMERINTAHAN KESULTANAN-KESULTANAN MELAYU DI KALIMANTAN BARAT", LANGKAU BETANG: JURNAL ARSITEKTUR, 2017
< 1% match (publications)

<p>Ali Keyvanfar, Arezou Shafaghat, Sapura Mohamad, Mu'azu Abdullahi, Hamidah Ahmad, Nurul Mohd Derus, Majid Khorami. "A Sustainable Historic Waterfront Revitalization Decision Support Tool for Attracting Tourists", Sustainability, 2018</p>
<p>< 1% match (publications) Miftachurahma Widanirmala, Maryono Maryono, Fuad Muhammad. "Vegetation resilience to absorbing carbon dioxide emissions in the Gajahmada Street", E3S Web of Conferences, 2020</p>
<p>< 1% match (publications) S L Hanida, A W Sejati, A R Rakhmatulloh, I Rudiarto. "Mapping Urban Population Behavior in Using Private Transportation at City Center of Semarang", IOP Conference Series: Earth and Environmental Science, 2019</p>
<p>< 1% match (publications) Warwick Anderson, Charles Zerner. "Bibliography", Walter de Gruyter GmbH, 2020</p>
<p>< 1% match (publications) "Animal Domestication", Encyclopaedia of the History of Science Technology and Medicine in Non-Western Cultures, 2016.</p>
<p>< 1% match (publications) "Conservation Plans", Wiley, 2008</p>
<p>< 1% match (publications) Guangliang Xi, Feng Zhen, Puel Gilles, Fernandez Valerie. "Spatio-temporal fragmentation of leisure activities in information era: Empirical evidence from Nanjing, China", Chinese Geographical Science, 2017</p>
<p>< 1% match (publications) Masashi Ushioda, Eiichi Takahashi, Morihisa Hamada, Toshihiro Suzuki, Kenji Niihori. "Evolution of Magma Plumbing System in Miyakejima Volcano: Constraints From Melting Experiments", Journal of Geophysical Research: Solid Earth, 2018</p>
<p>< 1% match (publications) Rukayah, R. Siti, and Bharoto. "Bazaar in Urban Open Space as Contain and Container Case study: Alun-alun Lama and Simpang Lima Semarang, Central Java, Indonesia", Procedia - Social and Behavioral Sciences, 2012.</p>
<p>< 1% match (publications) Jongwoo Cho, Hyun-Soo Lee, Moonseo Park, Kwonsik Song, Jaegon Kim, Nahyun Kwon. "Estimating the Performance of Heavy Impact Sound Insulation Using Empirical Approaches", Journal of Asian Architecture and Building Engineering, 2020</p>
<p>< 1% match (publications) Bruno de Sousa Lopes. "Ecological interactions and diversity of insects on Fabaceae species in the Brazilian Cerrado", Universidade de Sao Paulo, Agencia USP de Gestao da Informacao Academica (AGUIA), 2020</p>
<p>< 1% match (publications) Somjit Barat. "Looking at the Future of Medical Tourism in Asia", International Journal of Tourism and Hospitality Management in the Digital Age, 2021</p>
<p>< 1% match (publications) R Hidayati, W Setiawan. "The architectural transformation of historic mosques in Javanese rural settlements", IOP Conference Series: Earth and Environmental Science, 2020</p>
<p>< 1% match (publications) Rahayu Permana. "Topi Bambu Tangerang (Kearifan Lokal Berbasis Ekonomi Kreatif)", Tsaqofah, 2019</p>
<p>< 1% match (publications) Dian Ariestadi, Antariksa, Lisa Dwi Wulandari, Surjono. "Resilience of Historical Urban Multi-ethnic Settlement: Entrepreneurship and Religiosity Concept of Gresik City", IOP Conference Series: Earth and Environmental Science, 2017</p>
<p>< 1% match (publications) Irene Rwabudandi, Ira Mutiara Anjasmara, Susilo. "Crustal Deformation Studies in the Northern Part of East Java Derived from GPS CORS Data between 2015 and 2018", IOP Conference Series: Earth and Environmental Science, 2019</p>
<p>< 1% match (publications) Mahatmanto, Eko Prawoto. "Alun-Alun", Wiley, 2019</p>

<p>< 1% match (publications)</p> <p>Nurul Agustini, Totok B Julianto, I Putu Cakra Putra Adnyana, Luh Gde Sri Astiti. "The potential by-product of Indonesian superior native chicken", E3S Web of Conferences, 2021</p>
<p>< 1% match (publications)</p> <p>R S Rukayah, A B Sardjono, M Abdullah, A M A Aziz. "Inventory of old buildings and land subsidence in Semarang Old Colonial City", IOP Conference Series: Earth and Environmental Science, 2021</p>
<p>< 1% match (publications)</p> <p>R. Y. Setiawan, A. Wirasatriya, U. Hernawan, S. Leung, I. Iskandar. "Spatio-temporal variability of surface chlorophyll-a in the Halmahera Sea and its relation to ENSO and the Indian Ocean Dipole", International Journal of Remote Sensing, 2019</p>
<p>< 1% match (publications)</p> <p>Rattanaphol Mongkhorrattanasit, Charoon Klaichoi, Nattadon Rungruangkitkrai. "Printing Silk Fabric with Acid Dye Using a New Thickening Agent", Journal of Natural Fibers, 2021</p>
<p>< 1% match (publications)</p> <p>Sabeeh Farhan, Venus Akef, Zuhair Nasar. "The transformation of the inherited historical urban and architectural characteristics of Al-Najaf's Old City and possible preservation insights", Frontiers of Architectural Research, 2020</p>
<p>< 1% match (publications)</p> <p>Thaddeus Chidi Nzeadibe, Peter Oluchukwu Mbah. "Beyond urban vulnerability: interrogating the social sustainability of a livelihood in the informal economy of Nigerian cities", Review of African Political Economy, 2015</p>
<p>< 1% match (publications)</p> <p>The Changing World Religion Map, 2015.</p>
<p>< 1% match (publications)</p> <p>Andre Syahreza. "The topicality of pre-colonial Indonesian heroes: Recent popular fiction from Indonesia", Bijdragen tot de taal-, land- en volkenkunde / Journal of the Humanities and Social Sciences of Southeast Asia, 2012</p>
<p>< 1% match (publications)</p> <p>D Sarah, E Soebowo. "Land subsidence threats and its management in the North Coast of Java", IOP Conference Series: Earth and Environmental Science, 2018</p>
<p>< 1% match (publications)</p> <p>Husnayaen, A. Besse Rimba, Takahiro Osawa, I Nyoman Sudi Parwata, Abd. Rahman As-syakur, Faizal Kasim, Ida Ayu Astarini. "Physical assessment of coastal vulnerability under enhanced land subsidence in Semarang, Indonesia, using multi-sensor satellite data", Advances in Space Research, 2018</p>
<p>< 1% match (publications)</p> <p>Kyung-Yeon Kang, So-Yeon Park, Hong Heo, Myung-Sik Lee, Kyung-Hoon Lee. "Development of the vulnerability assessment model of explosive terrorism in multi-use buildings", Journal of Asian Architecture and Building Engineering, 2019</p>
<p>< 1% match (publications)</p> <p>Hegmon, Michelle. "1 Archaeology of the Human Experience: An Introduction : Archaeology of the Human Experience", Archeological Papers of the American Anthropological Association, 2016.</p>
<p>< 1% match (publications)</p> <p>Lisa-Michéle Bott, Bill Pritchard, Boris Braun. "Translocal social capital as a resource for community-based responses to coastal flooding – Evidence from urban and rural areas on Java, Indonesia", Geoforum, 2020</p>
<p>< 1% match (publications)</p> <p>Tigor Wilfritz Soadun Panjaitan, Dorina Pojani, Sébastien Darchen. "The transformation of public space production and consumption in post-reformation Indonesian cities", City, Culture and Society, 2022</p>
<p>Journal of Asian Architecture and Building Engineering ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/tabe20 Old Semarang City: the sustainability of traditional city patterns in Java R. Siti Rukayah, Shabrina Adine Vania & Muhammad Abdullah To cite this article: R. Siti Rukayah, Shabrina Adine Vania & Muhammad Abdullah (2022): Old</p>

Semarang City: the sustainability of traditional city patterns in Java, [Journal of Asian Architecture and Building Engineering](#), DOI: [10.1080/13467581.2021.2024196](#) To link to this article: <https://doi.org/10.1080/13467581.2021.2024196> © 2022 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group on behalf of the Architectural Institute of Japan, Architectural Institute of Korea and Architectural Society of China. Published online: 12 Jan 2022. [Submit your article to this journal](#) Article views: 295 [View related articles](#) [View Crossmark data](#) [Full Terms & Conditions of access and use can be found at https://www.tandfonline.com/action/journalInformation?journalCode=tabe20](#) [JOURNAL OF ASIAN ARCHITECTURE AND BUILDING ENGINEERING](#) <https://doi.org/10.1080/13467581.2021.2024196> [ARCHITECTURAL HISTORY AND THEORY](#)

Old Semarang City: the sustainability of traditional city patterns in Java R. Siti Rukayah a, Shabrina Adine Vaniab and Muhammad Abdulla hc
aArchitecture Department, [Architecture and Urban Planning PhD Program](#), Semarang, Indonesia; bArchitecture [Department, Universitas Diponegoro, Semarang, Indonesia](#); cIndonesian Literature, Universitas Diponegoro, Semarang, Indonesia

ABSTRACT Research on old city patterns in the world has become an area for archeologists. Historians and archeologists in Java, Indonesia, discovered a city center with a North-South axis, alun-alun (open space) surrounding by the government and religious building. This concept continued from the Majapahit Kingdom (12–15 centuries) to the Islamic Sultanate (15th century) and stopped in the Islamic Mataram Sultanate (17th century). However, Semarang City, as a city subordinate to the Islamic sultanate, has the same city center pattern, but the North-South axis is blurred. This research used data from several old maps, sketch drawings, photographs, and traditional city patterns in Java to find out the whole model of old Semarang City. Semarang also had a North-South axis that was no longer visible due to constructing the great pos road, railroad line, and city development. The sustainability of traditional city patterns in Java has not stopped in Mataram Islam sultanate city. This pattern also applied to the city as a sub-ordinate Islamic sultanate. The sustainability of the urban pattern, starting from the influencing power, shifted to the spreading of religion. The traditional city pattern can be a reference in city design based on the city's history.

ARTICLE HISTORY Received 20 September 2020 Accepted 22 December 2021

KEYWORDS Historical city; sustainability in city patterns; Java; Majapahit-Dutch era; Semarang's North-South Axis

1. Introduction, the Lost Identity of the Historical City Pattern in Semarang Research on old city patterns has increased among archeologists all over the world. These studies reveal the high intellectual tradition as local wisdom in managing a city (Australian ICOMOS Inc., 2012; Smith 2003). The local wisdom in traditional cities had the concept of astronomical, cosmological, and ritual aspects applied to local urban planning policies, such as the old Maya and Aztec cities (Graham 1996; Smith 2003; Sprajc 2009). Traditional cities in Asia, such as Chang-An (China), have similarities to Kyoto (Japan), have a North-South axis, a government center located in the middle, grid pattern, and Feng Shui concept. Feng Shui is a cultural phenomenon that prevails in China or East Asia and the West. The role of the silk route as a transportation link between countries is considered to have [an important role in spreading the concept and layout of the city](#). Moreover, this fact describes the influence of local wisdom traditions in designing old cities in various countries. The location of Indonesia is the world's maritime route. There also found some similarities in the concept and layout of the city center (Damuri 2014), especially in the cities on the Island of Java (Karsono 2008). There are allegations of acculturation with local cultures, such as in the Hindu era (8–15 AD) (Damayanti 2005) and the Islamic period (13 century) (Rukayah & Malik, 2012). The meaning of urban planning of the past is to understand how the people classified their activities to balance themselves with nature because their life was understood to lie in living in a sacralised cosmos atmosphere. (Handinoto 2007). The city center concept has similarities with the cities in traditional cities in Asia with an open space, north-south axis, government center, and grid pattern. There has been no further research on the relationship between traditional cities layout in Java and neighboring countries. However, many studies have examined the relationship between traditional cities in Java. Before the Dutch colonial arrived in Java, the cities in Java were classified as pre-modern or traditional cities. (Damayanti 2005). This era was marked by the redrawing of the ruins of the Majapahit kingdom city (1293–1500 AD) in Trowulan, East Java, by Henry Melville Pont (Tribinuka 2014). Experts considered Majapahit to be the beginning of planning for pre-modern cities in Indonesia. (Colombijn 2012; Roosmalen, 2011). The city center concept of the Majapahit kingdom became an unwritten reference for the kingdom's successor after the kingdom collapsed in 15 centuries. There are allegations that the Majapahit kingdom collapsed due to the arrival of Islam in Indonesia. (Muljana 2005). The emergence of the Demak Sultanate

marked it in 1475–1518 as the largest Islamic sultanates on the North coast of Java. CONTACT R. Siti Rukayah sitirukayah.tutut@gmail.com Architecture Department, Architecture and Urban Planning PhD Program, Semarang, Indonesia © 2022 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group on behalf of the Architectural Institute of Japan, Architectural Institute of Korea and Architectural Society of China. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

The Majapahit Kingdom was the last Hindu- Buddhist kingdom. After Islam religion came to Java, the formation system of kingdom turned into sultanate. The Islamic monarchy was called a sultanate with kings who had the title Sultan. In the Sultanate era, the sultan's role not only as the leader of the state but also as the leader of religion. Demak sultanate area was previously a subordinate port of the Majapahit kingdom. Then, it emerged as a new power inheriting the legitimacy of Majapahit's greatness. (Muljana 2005). The Demak Sultanate has a similar city pattern to the Majapahit kingdom. (Evers 2016; Handinoto 1992; Hendro 2014). In addition, there were Islamic Sultanates' cities that were contemporary with Demak City, which were Banten (1526–1813) in West Java and Cirebon (1529 -present) in West Java. There are similarities between the layout of the sultanate city because it was founded by the members of the Wali Songo. The Wali Songo (wali is Arabic for the saint, and the word sanga is nine in Javanese) were a group of saints of Islam in Java (Rahardjo 1997). Since the Walisongo era, the sultan has had a dual role as a state and religious leader. Different from the sultanate city of Banten and the sultanate of Cirebon, after the sultanate city of Demak collapsed, it continued to Sultanate of Pajang (1549– 1582), Kota Gede (1857–1600), Kartasura (1613–1645), Plered (1646–1680), Kartasura (1680–1756) until the existence of the Mataram Islamic sultanate in Surakarta (1744-now) and Yogyakarta (1755-Now) (see Figure 1). Of these cities, only Yogyakarta and Surakarta still exist today. The rest of them are just ruins. Based on archaeological research, the traces of these ruins reveal the same cities as its predecessor cities, Demak and Majapahit (Adrisijanti, 2000; Andrisijanti 2015). The Islamic Mataram kingdom center traces show the elements and the same urban pattern: the alun-alun that the government office surrounded (palace) and the religious building (the mosque), North-South axis, and city grid pattern. The king's power system in Java has a sacred form, with the concept of revelation, known as God-King (Jo 1984). Against this sacred legitimacy, the conception of cities that grew out of a kingdom center was undoubtedly based on a religious-cultural concept. A pattern of the urban structure was developed, which had unique characteristics (Junianto 2019). In Javanese spatial conception, an alun-alun/open space in the city center is the part of the deepest circle of Javanese power (Lombard 2005). Therefore, what about other cities in Java that also have the same urban pattern even though they are not kingdom cities and not the sustainability of Islamic Sultanate cities? There is a hidden knowledge that the traditional urban layout in Java did not stop in the sultanate cities, as revealed by archaeologists. An example is Semarang City. Semarang in the 15 centuries was a group of the Island (30 km west of Demak) that became a subordinate city of Demak and a place for the spread of Islam from Demak. Semarang and the Demak Sultanate were located in the mouth of the Muria strait. (Yuliati 2014). At that era, Demak was a maritime country. The location of Demak in the Muria strait was very beneficial for trade and agriculture activities. The waterway that separated Central Java and Muria Island was quite busy and could be Figure 1. The journey of urban planning concepts in Indonesia, from the Majapahit kingdom (blue dot), the Islamic Sultanate (red, dark blue, and light green dot), the Islamic Mataram Sultanate, to the subordinate city of the Islamic sultanate (dark green square). sailed freely from Semarang via Demak. In other words, Semarang was a transit port to Demak. However, the strait was no longer navigable in the 17th century (Graaf De H.J And Pigeaud, 1985) until the Islands of Java and Muria unite. Furthermore, this paper aims to uncover the sustainability of the city center concept in Java from the Demak Sultanate to Semarang. During the spread of the Islam era, the urban planning sustainability model underwent a slight modification, which no longer included Hindu beliefs as in the previous period (Majapahit Kingdom). The concept of the sultanate cities on the north coast of Java indeed has the same city pattern as its predecessor. Still, there were allegations of modifications because these cities have a concept waterfront city with the port connected by the road corridor to the government center (Rukayah, Roesmanto, and Sukawi 2013; Rukayah et al. 2018a). Recently, the layout of old coastal cities lost its identity due to the rapid development and geological disasters in coastal areas. The old city pattern acted as the center of government and religious space, the north-

south axis as the main gate, commercial areas, and the connecting view from the city center to the port (Rukayah et al. 2018a) in several cities were blurred. There was wisdom in managing the city layout as the center for a government facing the sea. The sea as a world trade route resulted from the port cities developing into trading areas. The connecting road corridor from the city center to the port is expected. The concept of the sultanate/center of government faced the sea, and the North-Road corridor was a welcome area for immigrants and the square as a place for celebrating religious broadcasts that were controlled by the sultan (as a religious leader and government leader). (Rukayah, Malik, and Malik 2012). The market position was near the port, making the North road corridor from the port to the city center. (Rukayah et al. 2018a; Rukayah, Susilo, and Abdullah 2018; Rukayah et al. 2018b). There was an assumption that local wisdom in managing the city as the center of government in this era no longer has the concept of astronomical, cosmological, and ritual aspects but the city center as central government, religious and economic area. The connecting road corridor (now called Jalan Layur) from the city center to the port is expected as the North-South in Semarang city also opens up research opportunities to prove it from other data. This North road corridor was no longer visible due to several factors such as city development (Hutama 2018) and postweg construction (Colombijn 2012; Pratiwo.P.Nas, 2002; Van Roosmalen 2011). Cities traversed by the postal route transformed into modern cities. (Pratiwo 2002) (Toer 2005). This transformation into modern cities also happened in several historic cities in the world, such as Konya, Turkey; (Yald, Ayd, and Büyük 2014); Karbala, Iraq (Farhan, Abdelmonem, and Nasar 2018); Doha, Qatar (Boussaa 2017); and Gaza, Palestine (Mohamed and El-saqqa 2011). These cities had changes in city identity caused by the [face of rapid economic development, population growth, increasing needs, and changing lifestyles](#) (Boussaa 2017). In Java, the transformation of traditional cities into modern cities on the North coast due to rapid development occurred in the Dutch Colonial era. The Dutch colonization process in Java lasted for several centuries since their trading posts were built in the coastal cities to control transportation infrastructure throughout Java. Although the influence of colonization looks dominant in building a system of the urban network in Java, it is the opposite in the scope of urban space. The colonization process does not remove the concepts of urban space forms that have already existed in Java. The alun-alun, for example, is the landmark of the city center derived from the pre-colonial traditions, which still survive with modern modifications (Gunawan et al. 2013). These colonial-creation cities are widely spread in Java. Even in Semarang City, the Dutch colonial maintained the north road corridor leading to the port from the alun-alun by planning a new canal. The concept continuation in the colonial era further enhanced the North road corridor strategy value to become a commercial area. Until the 1950s, this area was the center of urban trade (Dinas Perdagangan Kota Semarang 1956) and now leaves the trail of a unique architectural characteristic of shop-houses along the north-south axis. (Rukayah et al. 2018a). The past glory as a trading area was lost. This route, cut off by the railway and postal lines and natural phenomena that had further degraded the quality of the environment. This area is now experiencing a decline in the area due to land subsidence. (Abidin et al. 2013), flood, and tidal flood (Soedarsono 2012) (P.Hadi 2017). However, this environmental degradation still leaves people who remain resilient in overcoming disasters (Erlani and Nugrahandika 2019). Semarang [Government policies in dealing with these problems are focused on phenomena such as normalizing rivers to prevent flood and building polder systems from preventing tidal flood](#) (P.Hadi 2017). These efforts can minimize the tidal flood disaster. Several cities along the coast of Java, such as Jakarta, have proposed building sea walls to protect their old cities (Takagi et al. 2017). To preserve the remnants of old cities and their past glory as a character area with multi ethnics shophouses along the north road corridor required conservation efforts, so the economic potential could be utilized by the people who remain in it. The Multi-ethnic shophouses in Singapore areas such as Glam Village (Guan 2011) and Chinatown (Yeoh et al. 2012) had been conserved and had become heritage tourism and had economic power. Architectural conservation refers to the maintenance and protection of architectural work, either a building or an area, to prevent damage and destruction of the work. (Australian ICOMOS Inc 2012). The revitalization strategy in an area facing a sea-level rise and land subsidence problems was essential (Reeder-myers 2015). However, even though the coastal communities of Semarang were resilient in facing [sea-level rise](#) and [land subsidence](#) (Erlani and Nugrahandika 2019) and [have](#) to carry out contributed (Miladan 2016), the revitalization still required the contribution of support and efforts from the government. A strong commercial footprint required a revitalization strategy [to enhance and improve the economic development of the places for tourism attractions](#) (Keyvanfar et al. 2018). For

a long time, changes that had been going on to lose urban identity were the lack of monitoring tools from the government regularly [due to the rapid urban changes in historical cities](#) (Boussaa 2017). In addition to the absence of monitoring in this area so urban identity has also become blurred could be caused by the geological disaster (Arianto 2013; Rukayah, Respati, and Susilo 2016). To uncover the loss of old city patterns through excavations in some old cities, archeologists was once examined using excavation methods and radar (Homburg, Windingstad, and Beery 2012). Beside these two methods, some archaeologists in Indonesia have conducted studies on how to reveal old city patterns, such as explaining the patterns of cities in the Islamic Mataram Sultanate by using the pattern of traditional cities in Java (Adrisijanti, 2000; Andrisijanti 2015). This researcher often used this method because they suspected the pattern of traditional cities in Java from the Majapahit era to be an unwritten reference for the next successor kingdom (De Graaf and Pigeaud 1985; Rukayah, Roesmanto, and Sukawi 2013). It could use the method by identifying the predecessor cities to identify the heritage of historical cities (Freestone, Marsden, and Garnaut 2014). Loss of identity was the dominant theme to mitigate the cultural damage (Kalman 2017). The excavation methods and radar used by archaeologists did not need to use to uncover the old Semarang city model because the traces of the old city were above ground level. Evidence of the city center composition consisting of the alun-alun, mosque, and the former government offices still existed. From this composition, only the north-south axis was not visible. Thus, the researcher would reveal the city model as a whole using the remaining traces. Researchers would carry out a method similar to what archaeologists had done to trace the paths of the Islamic Mataram Sultanate city by using the Javanese city pattern and be strengthened by a series of old maps. Semarang has a relatively complete range of ancient maps drawn during the Dutch colonial era. The maps are now stored in KITLV and Atlas Mutual Heritage ([a database with information, maps, sketch drawings, prints, and paintings of locations related to the Dutch East India Company](#) (Verenigde Oost-Indische Compagnie, VOC) and [the West-Indische Compagnie \(WIC\)](#)). Understanding a city's history was crucial for urban planners and designers because most urban planning techniques depend on extrapolating from the history of the city itself. (Hartono 2005). Findings of the city pattern in Semarang are expected to become a city identity and city pride that needs to be conserved. The role of urban conservation was to define and highlight the city's identity and local context and reflect civic pride of place for the people. They were not only functional containers but also symbols of cities from time to time. Thus, the government presented a challenging situation to preserve the historical-cultural heritage, local originalities, and city identities (Yald, Ayd, and Büyük 2014).

2. Materials and methods

2.1. Maps and old photos as main data

Based on the research question on whether the old city center in old Semarang had a [North-South axis as part of the](#) city pattern as a whole, researchers needed sufficient data to understand the city condition in the past. The historical method (Kuntowijoyo 1994) using data in the past, such as maps, photos, news, and history books, was cross-checked with the current conditions by conducting field surveys. Researchers revealed the morphology of Semarang from old Semarang maps from 1719, 1817, and 1880, obtained from KITLV, old sketch drawing maps of Semarang 1695 from Atlas Mutual Heritage, and an old sketch photograph 1857 painted by Johannes Rach (see Figure 2a). The old maps appeared that there was a line from the square in the city center towards the North (Melayu Village). The research started from the line drawn and confirm the condition in the field. We obtained the initial shape of alun-alun from an old sketch photograph 1857 painted by Johannes Rach. Photos of the [transformation of the alun-alun as an open space](#) had been divided by the tram network and postal lines (see Figure 2b). The loss of the [alun-alun as an open space](#) changed the square to commercial space in the era of 1960-the 1970s. (Arianto 2013). (see Figure 2c). This phenomenon is amplified from the news in newspapers around the 1970s reporting the alun-alun change due to the construction of shopping centers, hotels, and traditional markets. The [existence of the north-south axis](#) on [the](#) map appears in an unclear line. Not many experts mention the existence of this axis. Through old pictures and maps speak more about the past condition than (a) (b) (c) Figure 2. Some photos showing the morphology of the alun-alun (a). [Center of the old Town in Semarang, Dalem and alun-alun with the colonial city as the background, painted by Johaness Racht \(1857\)](#) (b) Construction of the railroad and postal highway that crossed the square, early 18th century, the square shaped like a kite. (c) Construction of the Jaik Market in 1970 located next to the Johar Market make the entire alun-alun no longer an open space. a narrative (Pole 2004). The traces of the old city center of Semarang on the old maps by the composition as follows: the traditional city center comprised a paseban (alun-alun), a Javanese temple (a

mosque), dalem (the Kanjengan office), and pasaar (a market), which were located close to the river and Javanese nagorij (Javanese village) on the northern side. The shape of the city resembled the traditional Javanese city center (see Figure 3). We can see the description of the pattern of the city in the past through old map series.

2.2. Traditional city patterns in Java as the tool to uncover the Old Semarang City pattern

Beside using the old maps, old drawing sketch and old pictures as a reference to determine the original pattern of old Semarang, the researchers conducted the theoretical study of the shape of a traditional city centers in Java to confirm the findings.

Traditional city in Java called as Kuta (city) to distinguish it from the village. It means a residential area that is protected by the walls built surrounding it in the form of square (Wiryomartono 1995). Kuta in Java will relate to the state's context as the government center, from Hindu- Buddhist civilization to Mataram-Islam. Below, the concept of the city pattern from the Majapahit (Hindu- Buddhist civilization) era to the Islamic Mataram era will be revealed.

2.2.1. The pattern of traditional city in Java

Regarding the city center's pattern in Java, M.C. Ricklefs said in the Book History of Modern Indonesia and the Majapahit Kingdom was the beginning of urban planning in Indonesia (Van Roosmalen 2011). The information related to Majapahit's capital was obtained from Negarakertagama (Old Javanese eulogy to Hayam Wuruk, a Javanese king of the Majapahit Kingdom). This eulogy was written on palm leaves (lontar) by Mpu Prapanca in 1365. Empu Prapanca, as the writer, was a Buddhist official who lived in Majapahit and witnessed all matters related to the palace. Negarakertagama was written around the 14th century in Majapahit. This manuscript had already mentioned a square that stretched from the north to the south (Muljana 2005) (see Figure 4a). The spatial structure formation of Majapahit City continued to exist in the Islamic sultanates spatial structure in Java. The city founder implemented the spatial plan of the Majapahit with a square as the city center, a religious building on the western side, and The street on the northern side was cut by the railway and posweg and covered by buildings (a) (b) (c) (d) Figure 3. Some maps showing the north axis and morphology of the alun-alun until the northern part of alun-alun disappeared. (a) a road corridor that estimated as North-South axis and the alun-alun that has not been drawn on a 1695 map (b) The north-south axis connected to the alun-alun in the city center, 1719 (Source: Atlas Mutual Heritage). (c) The alun-alun in the city center of Semarang, 1880 that shaped like a kite. The north-south axis had already been cut by the rail road and postweg: KITLV. (d) The alun-alun in city center of Semarang which is covered with buildings and separated from the north axis, in 2020 Source: Google earth. Figure 4. Sustainability of traditional city pattern in Java, from Majapahit, Demak, Surakarta and Yogyakarta (red dot) (the north-south axis, the religious building, the square, and the palace/duke's office). (a) Sketch describing the reconstruction of Majapahit City by Maclaine Pont (1924) based on Nagarakertagama. (b) Old map of Demak, 1911 from kitlv. (c) Sketch map of Yogyakarta in 1755. (d) Sketch map of Surakarta in 1745, old map of Banten 1660 (e) and old map of Cirebon 1690 from Atlas Mutual Heritage. (d) and old map of Cirebon. g) Banten and Cirebon (yellow), Semarang (green dot). a government office on the Southern side (Tribinuka 2014) during the establishment of the Demak Sultanate. (see Figure 4). At first, the Demak Sultanate on Java's north coast was a port fief to the Hindu- Buddhist Majapahit kingdom. The entry of Javanese- Islamic civilization developed by Wali Songo, in many ways carried out cultural acculturation and development of Hindu-Buddhist culture in the old Javanese era. The city center of the Demak and other sultanate cities in coastal cities in Java had similar city patterns (Damayanti 2005). Before Islam was accepted by most local rulers and people in Java were created according to Hindu Buddhist cosmology (Hutama 2018). This planning concept slowly changed from cosmology and ritual-oriented to ritual and commerce-oriented as soon as the local rulers converted to Islam in the 15th century. Several archaeologists and historians had stated the pattern of sustainability of urban planning from the Majapahit-Islamic sultanate era to the Islamic Mataram era. From the point of view of architecture and urban design, researchers uncovered phenomena in Semarang City. Semarang was not sultanate city. Semarang city was the only regency (the late 15th century) and the one and only of the Demak Sultanate's fiefdoms. Semarang was a place to Ki Ageng Pandan Arang (also called Pandanaran), the grandson of the sultan of Demak, to spread Islam religion. The sketch map of Semarang in 1695 shows the shape of the city center of Semarang. The existence of relics of part of the shape of the city center of Semarang, namely alun-alun, mosque, and former residence of the regent (district office) that had similarities to Demak Sultanate. However, the absence of a North-South axis raises the question about the city shape as a whole. There was a line on the old map of Semarang from the square to the north (sea). Confirmation of this line with the reality on the site using field survey, the line is a road

corridor (Layur street). The existence of the line that was thought to be the axis in Semarang City is now missing. This line was no longer connected to the alun-alun because it was cut off by the Dutch colonial era's postal road and city development. To uncover the [existence of the North-South axis](#) to find [the](#) concept of [the](#) city pattern as a whole, the city pattern of Demak, Surakarta, Yogyakarta was used to discover the pattern of Semarang city. This paper also used the sultanate cities of Banten and Cirebon as references. Both cities were established in the same era with the Demak sultanate and had a strong relationship with the Demak Sultanate spreader of Islam founded both in Java. The old Banten and Cirebon sultanate urban pattern was also an analytical tool to analyse the Semarang city pattern. Unlike Demak City, which had lost its sea, Banten and Cirebon were still on the coast. Old news and relics of old maps are complete. It could be used to reveal the pattern of the city center. On the old map of Banten and Cirebon (see Figure 4), it could be seen that there was a line as the [North-South axis](#) that connected [the](#) port [and the](#) alun-alun [in the](#) city center. Using the old Banten map as an analytical tool that at the end of the North axis, there was a port. We can conclude that the location of the old port of Semarang is also at this location. (Rukayah et al. 2018a). Location of the old port of Semarang in the 14th-15th century, referring to geologist van Bemelen's theory, had a coastline in the Sleko region (in Northern side of the city center) (Bemmelen, 1949). Historians and senior photographers also believed that Sleko was a coastal area (Tio 2002). The following supporting evidence was the 1719 Semarang map, which revealed that a coastline in 1695 was in Sleko. Toponym relics referring to names of places like ports are the markers that these areas once had a coastline (Rukayah et al. 2018a). Therefore, the line on the old Semarang map of 1695, 1799, and 1880 was the North-South axis that connected the square to the old port of Semarang (see Figure).

2.2.2. The North-South axis in traditional city centre in Java The city center usually unified the hearts of old cities with public spaces, which created unique spaces and functional characters. The alun-alun as a public space in the Java traditional cities (Rukayah 2010), was also the city's heart with a unique setting. The North-South axis city layout existed since Empu Prapanca (the writing master) had written the Majapahit era in the old manuscript called *Negarakertagama Canti VIII* verse 3, which was translated as follows: The area (yard) of wanguntur, on each side is a watura with a witana in the middle, to the north of the houses where Menanti, the bhujaṅga with mantras, (Th. Pigeaud, *Java in The Fourteenth Century II* dalam Hendro 2014, 18). In the Islamic era, the same city structure as the sustainability from the pre-Islamic period could be identified by the following characteristics: The dominance of the North-South axis, the location of the Mosque, the function and location of the alun-alun, the palace and market, and others originated from the pre-Islamic era. In contrast, the arrangement of Javanese cities in the pre-colonial era was based on hierarchical and microcosmic dualistic concepts. (Damayanti 2005, 35) The North-South axis's dominance was indeed the pattern and model of traditional urban planning in Java (Gomperts, Haag, and Carey 2010; Handinoto 2007; Mulyadi 2014). There was an allegation that the North-South axis concept was still used in the Islamic not only because of cosmological factors but also because of geographical factors. The geographical position of the harbor on the north coast allowed for [access to the alun-alun](#) in [the](#) city center. [The](#) city founder formed [the north-south axis](#) from [the](#) alun-alun towards [the](#) port and market because the sea was on the Northside. Ports and markets became transit points for traders from various worlds, such as Banten (Wahda 2015). Thus, even though there was a North-South axis from the Banten square, this axis was not explicitly formed or was not applying cosmological concepts from previous cultures. (Rukayah, Malik, and Malik 2012) (see maps of Banten and Cirebon in Figure 4e,f). Similarly, based on old map searches, the alun-alun was not strictly square. It was only an open field (see Figure 4).

The city square The city square The city square North axis North axis North axis (a) (b) (c) Figure 5. Some maps showing the morphology of the city square; the perfect shape of the old alun-alun of Semarang was shown in the 1787 map. This shape followed the city pattern in Java, using the north-south axis. (a) The old map of Semarang 1695, Source: Atlas Mutual Heritage. (b) The old map of Semarang 1719, Source: Atlas Mutual Heritage. (c) The old map of Semarang 1787, Source: Atlas Mutual Heritage. Based on Semarang old maps, early urban growth has shown a similar pattern. However, there is a different picture revealed from the map in 1741. The outline of the 1741 map was slightly more transparent than the previous plan. On the map, there was a thin straight line on the northern side of the square. By comparing the Semarang map with the Cirebon and Banten maps, which have the same form of a line from Alun-Alun to the sea, it can conclude that Semarang City has a [North-south axis. The](#) continuity [of the road](#) corridor to [the](#) alun-alun subsequently experienced a reduction due to the construction

of the Groote Postweg Road during the Dutch colonial period (1809–1811) (Pratiwo 2002; Priyantoko 2010). As a result, the shape of alun-alun was like a kite (maps of 1719 and 1880 and photos of the late 18th or early 19th century, sources of Atlas Mutual Heritage and Kitlv) (see Figure 2b). The construction of postal roads and railway lines in the 18th century had cut the North-South axis towards the alun-alun. The road and railway had lost the alun-alun functioning as public space because it was traversed by the road and the train tram line. (see Figure 2b). However, the construction of the road had transformed the city into a modern one. This phenomenon also happened in other towns traversed by the postal route (Toer 2005). This phenomenon was also followed by the construction of the Johar Market in 1930 on the east side of the square (1930s photo source kitlv) (see Figure 2c). The open space of alun-alun almost lost because in the 1950s, there had already been activities and market buildings in it (Brommer et al. 1995). In the 1970s, the alun-alun as the open space disappeared because Jaik market buildings had been erected on it (1970s photo source kitlv) (see Figure 2c). Once a public market and a bemo station (tricycle public transport), the modern market had turned the remaining square area into the Jaik market and Metro Hotel. Moreover, the Kanjengan office on the Southern side became a shopping complex. Such changes also occurred around the alun-alun, and the modern market eventually banished the existence of the alun-alun. Hence, the lost traces of the traditional city center pattern, leaving only a mosque. The open spaces that were part of the alun-alun that have lost and the North-South axis cut off towards the alun-alun revealed that Semarang city had a city layout similar to the traditional towns from the era of the Hindu-Islamic sultanate and Islamic Mataram. It happened because there were allegations that the appointment of Ki Ageng Pandanaran (grandson of the Sultan of Demak) to become regent of Semarang was an extension of the power of Demak to the west. In contrast to establishing the cities of the Islamic Mataram kingdom as a continuation of the Demak sultanate [based on the establishment of the state](#), the [development](#) towards [Semarang city](#) was purely to develop Islamic broadcasting. This fact could be seen even though it had the same city layout, but [on the south side of the alun-alun](#) built [was](#) not a palace but a district office, the city leader was not a sultan but a regent. Thus, this research's findings are the continuity of the shape of the city center to the city that is not a sultanate city but is a subordinate city for expansion city, and the spread of Islam is new knowledge. Therefore, the character of Semarang city is the identity of the town that needs to be conserved.

3. Discussion and analysis

3.1. The northern part of axis as a connector of the city square and harbor

After the collapse of the Majapahit kingdom, an Islamic sultanate emerged on the coast of Java. In this period, there was a substantial increase in commerce in Southeast Asia, particularly in Java. These trade lines stretched from India, Cambodia, China, Vietnam, Champa, South India, Bengali, and Siam (Damayanti 2016). As a result, cities on the North coast of Java had turned into busy port cities. Geographically, the cities in Java can be divided into two regions, namely coastal towns and inland cities. At the beginning of its development, both cities had the same structure. However, in the following periods, the coastal cities had a different system from inland towns. Moreover, the design of coastal cities gradually changed due to frequent interaction with foreigners from various countries. Therefore, inhabitants of the coastal cities were more heterogeneous than those living in the inland towns (Damayanti 2016). Thus, the journey of city development that started from Majapahit to the coast in Demak City and the cities of Sultanate [on the north coast of Java](#) has experienced adaptation to a new culture. As a port city that often came into contact with foreign traders (Wahda 2015), multi-ethnic diversity was apparent in sultanate cities on the coast, such as Cirebon, Banten dan Semarang. Based on the old maps from the Atlas Mutual Heritage and Kitlv, there was a similar city pattern between Banten and Cirebon old city. The cities consisted of a square, mosque, palace, and a North-South axis facing the sea coupled with ports and markets and multi-ethnic areas. The existence of the mosque is a religious building that replaces the temple during the Hindu acculturation. Another adaptation is the existence of multi-ethnic settlements near the port. By comparing the sultanate cities on the north coast of Java, a strong impression of the position of the North-South axis from the direction of the alun-alun was a road corridor to the port. The overall pattern of this city resembles the concept of cosmology in cities in the Hindu era. The form of the layout of the coastal city still used adaptations to the influence of the previous culture. Based on Hindu belief, in connection with Kostof's theory in 1991, the city of Majapahit was categorized as a cosmic city (Smith 2007). In Hinduism believe, inside the sacred space (microcosm), humans did their activities based on the cosmology of the population, and they needed cosmography to make decisions. Efforts to realize this philosophy in its physical form were manifested in regional

planning and building planning. They adhere to the physical elements, namely, the central (Axis Mundi & Imago Mundi), the hierarchy, the axis, and the orientation (Handinoto 2007). The grand design of the sultanate cities included the plan on which economic area (market), sacred religious and political areas in the southern part could reference their successor in the Islamic era. (Damayanti 2005). [In the city center of the](#) Islamic Sultanate cities, [the](#) core [space](#) considered sacred (alun-alun) is important events related to the government, society, and religion. Religious events were held in the alun-alun with the mosque as the controller of activities. Meanwhile, the government events took place in the alun-alun with the palace or dalem as the controller of activities (Wessing 1992). In Banten, government activities and religious activities were held in the alun-alun, designed to be more entertainment-oriented for the community. (Talens 1993). The north-south axis connected the crowds of people with entertainment in the city center to the commercial area on the northern side, where a market and port were usually located. The formation of the North-South axis in the Islamic era had come out of the cosmic city concept. In the alun-alun, there was also a tradition of bringing together people and leaders and various multi-ethnic communities in the Dugderan event. Dugderan is an event to welcome the month of Ramadan. (Cahyono 2018). This activity is also an annual market activity. Thus, the city center becomes the center of religious, economic, and government activities. The multi-ethnic impression formed because the alun-alun is the center and surrounding by a multi-ethnic residential area (Rukayah et al. 2021). The North-South axis from alun-alun acted as the road corridor to the market from the multi ethnic settlement to the port (Rukayah et al. 2018a; Rukayah, Susilo, and Abdullah 2018; Rukayah et al. 2018b). We also found this concept in the Surakarta Sultanate. Although located in the hinterland, the city was adjacent to the river. As a riverfront city, Surakarta revealed that the North-South axis had formed a road corridor headed to the port from alun-alun, which led to thriving international market activities (such as in Karangantu Banten) (Fauziyah 2012; Permana 2004). With ports and markets in the Northern end of the waterfront cities, the North-South axis had developed into a commercial area characterized by a row of shops and shophouses. The strong character that shows the north-south axis in Semarang City is the former existence of a port at the end of the North axis (toponym of the kampung Darat) which means a landing place, the old Boom area (a Dutch term which means port portal). Now, this former port only leaves the name. The area used to be the main gate to enter Semarang City from the sea (Rukayah et al. 2018a). A strong impression of the function [as the main](#) gate leading [to the alun-alun](#) is [the](#) presence of a row of shops and shophouses, which indicates that this area was a trading area. (Rukayah et al. 2018a). the existence of road lanes on the north side of these cities does not directly replicate the previous cultural concept. the road is formed as a channel from the port to the city center

3.2. The port as the nodal northern part of axis of the coastal city

There were fascinating city patterns and structures in waterfront sultanate cities [along the north coast of Java](#) and riverfront city [in the](#) interior. The North-South axis of the riverfront city center led to the location of the city/port on the riverbank. (Prayitno and Qomarun 2007). Meanwhile, we also explained the location of the natural port from the history of Surakarta City. In the past, Surakarta was better known as the village of Solo. Solo had a port called Bandar. Solo was initially formed by the laborer community (Javanese: soroh bau whose leader was called ki-soloh or ki-solo or ki-sala) in Bandar Nusupan. They lived [on the banks of the](#) Bengawan Solo [river, near the](#) port where they worked for their employers in Kadipaten Pajang (the 1530s), thereby forming riverbank settlements (similar to a waterfront settlement) (Prayitno and Qomarun 2007). The location was [on the](#) Northside [of the North-South axis](#). Some cities in [the](#) coastal also had ports/boom that connected directly to the alun-alun as the city's center. The word boom has a similar meaning to the port in English. We obtained an overview of the shape of the natural port from the history of Tuban City. The port was built long before the Dutch arrived. As recorded in history, due to the agreement between Pakubuwana II and the VOC in 1749, the entire north coast of Java became the VOC territory. Geographically, the port of Tuban was just into the sea, and the location is only a few hundred meters from the northern side of alun-alun Tuban. The port functions as a dock for the ship. Due to the sedimentation process of the Tuban coast in the 16th century, large boats must dock in the middle of the sea. With this port, medium-sized ships were expected to dock at the harbour (Hartono 2005). Banten sultanate city is a city with extensive recorded data made by the Dutch colonial government in maps and sketch drawings. The strategic location of Banten city, the port turned into the center of the busiest market network (Fauziyah 2012). The site of the market is [on the](#) Northern [side of the alun-alun](#). The square [is](#) sometimes [used as](#) a market in [the](#) morning. Willem Lodewycksz in 1596 described the structure of Banten

City as follows: In the market in the east side of the city (Karangantu), both morning and afternoon there are traders from various nations such as Portuguese, Arabic, Turkish, Chinese Quilin (Keling), Pegu, Malaya, Bengal, Gujarat, Malabar, Abyssinia and from various places in Indonesia to trade until nine o'clock. Then in the second market, which he said it was located at Paseban (the square), where all necessities for life sold, the market was open until noon or even the whole day. In the afternoon, there is also a market in the Chinese village . . . (Fauziyah 2012, 87) The function of alun-alun as stated below: There is a large square in the middle of the city called alun-alun, which is used for military or folk arts activities and also functions as the market in the morning. Next to alun-alun, there is a flat building that is high up (Guillot, Nurhakim, and Wibisono 1997, 105). The city's founders used the concept and layout of the city pattern with alun-alun as the city center that faced the port area. Referring to the position of the port that right at the end of the North-South axis formed in coastal cities and inland cities based on waterfront cities, Semarang City had the same urban pattern that in the nodal of the North-South axis was a port. Based on toponym excavation, architectural traces, and a lighthouse which is now a mosque tower, the area at the end of the North-South axis, now known as Layur street in the Malay Village, was formerly a port. Traces of the existence of the market at the northern end of the road still exist.

3.3. How about the pattern of the Old Semarang City?

To fully uncover the pattern of Semarang city in the past, in this chapter, we will discuss the morphology of Semarang city patterns. The map of 1695 had described the map of 1695, the colonial city fort's location. The Chinatown was depicted in the eastern and a [mosque on the western side of the](#) river. [The](#) city pattern, however, did not follow the Javanese city pattern yet. We suspected that this mosque/temple was the forerunner of the central government of Semarang. The layout of Semarang's city is fully illustrated on the old map of AAN van het Fort en omlegende Cituatie van Samarangh 1695. The map had described the existence of Pasebaan/alun-alun. Nevertheless, the mosque location was still located east of the dalem complex/ regent house (see Figure 5a). The mosque's position in 1719 was the same as the map in 1695 (see Figure 5b). The location of the mosque's existence was unique because it was not located on the west of the city square (Roesmanto and Iswanto 2018) (see Figure 5a) In Figure 5b, the 1787 map shows that the pattern of the old Semarang was similar to the other traditional city patterns in Java, particularly the old Demak city pattern. The mosque on [the western side of the alun-alun](#). A line of roads north of [the](#) alun-alun showed that the city pattern has the North-South axis. The local government formed the perfect design of Semarang city because the mosque of Semarang, which is still standing today, was built in that area to replace the old mosque (located in the east of the town square, shown in the 1695 map). This mosque was damaged by fire during a riot at Chinatown in 1741. According to Javanese inscriptions and letters engraved on the marble wall at its entrance, the Great Mosque of Semarang was built in 1170 Hijriah (Islamic calendar) or 1749 A.D. According to the old maps 1719, the center of Semarang was not far from the coast. The old map of 1719 showed that the coastline in 1695 was in the vicinity of Sleko and Kampung Melayu (Malay Village), where there are toponyms such as the old boom (port) and Kampung Darat (the landing site of the ship passengers). A toponym is a place that refers to the geographical forms, origins, and people's works (Ostermann, Perdana, and Ostermann 2018). [Names have significant historical and heritage value, and in carrying memories of the place's past, they represent its collective memory](#) (Hakala, Sjöblom, and Kantola 2015). We can see the Northern part of the axis in old Semarang in the 1719 map from Atlas Mutual Heritage (see Figure 6). The axis is now called Layur Corridor. This corridor is the road section in a multi-ethnic village, Kampung Melayu Semarang (Semarang's Malay Village), formed by two rows of Chinatown and Arabian shop houses. The Layur corridor location was strategic because it connected the port and the alun-alun (Rukayah et al. 2018a, 2018b). The multi-ethnic Malay village laid along the coast. So, the people of Malay village had already interacted with foreigners who came as traders and lived there. This village was once the first port in Semarang before Dutch colonial built the new port. In 1875 AD, the Dutch East Indies government opened the new canal as a new straight line replacing the winding Semarang River lane. The opening of the new canal further strengthened the Layur Corridor's function as the trade corridor because the corridor was the confluence between the Semarang river and the new river channel. (see Figure 7) Figure 7 shows the overlapping of some old maps and sketches to clarify the connection between the North-South axis and the alun-alun. Semarang's The local The local government government office office The The square as alun-alun as the city center the city center Layur Layur Corridor as Corridor as the north the north axis axis (a) (b) Figure 6. Old map of Semarang showing Layur Street as the North-South axis of the square

(Source: kitlv). (a) Map of 1719 showing a river (the blue line) leading to Kampung (kampong) Darat that is believed to be a dock in the past. (b) Map of 1787 showing the structure of the old Semarang and the Layur Corridor. Figure 7. Using several old maps and sketches, the position of the Layur Corridor as the northern part of axis of the alun-alun was finally found. coastline position in 1619, based on the 1719 map, is in blue. The position of Kampung Darat as the old boom (port) in the Dutch colonial era was facing the blue color in the sketch map, at the end of the Northern part of the axis. The sketch suggests that the shape of the city center structure of the old Semarang follows the pattern of the general city center structure of traditional cities in Java. The port location is similar to the port position of the sultanate cities in coastal areas in Java-like Banten and Cirebon. Figure 8. Remaining old buildings, that used to be shop houses, are strong evidence that this road was the northern part of axis (Layurs street in 1927, 1930, and in the present) (Source: kitlv and field survey) (a) The old photo of the northern part of axis of old Semarang in 1927, (Source: kitlv). (b) The old photo of the northern part of axis of old Semarang in 1930, the row of shop houses gives the fact that this area was a commercial corridor (Source: kitlv). (c) The recent condition of the northern part of axis. The Layur Corridor became the North-South imaginary axis connecting the port (boom) with the local government officials at the alun-alun. This concept is similar to Islamic Sultanate [cities on the North coast of Java](#) and waterfront-based cities like Surakarta. The North-South axis position is the supporting evidence taken from the old map sketches of the Dutch book written by Tillema. The old map showed the alun-alun, the Kanjengan office, the road line at the Northern side [of the alun-alun, and the mosque](#). Like other cities in Java, the Layur corridor was also developed as the trading area. In this area, we found many shophouses with Chinese, Malay, and Arabic characters. However, their buildings are now abandoned, damaged, and have even collapsed due to the land subsidence and tidal flood. (see Figure 8.) The traces of the existence of these trading buildings show the similarity of the function of [a North-South axis on the](#) cities of [the](#) Islamic sultanate. [The](#) traces of the building show that the Layur Corridor used to be the North South axis from alun-alun.

4. Conclusions

This study has found the continuity of the traditional city layout model in Java from the Majapahit era to the era of the Islamic Sultanate, and the Islamic Mataram era until it turned out to be continuous in the city under the rule of the Islamic sultanate, namely in the city of Semarang. This research explained that even Semarang was not a sultanate city, but the city layout in old Semarang showed the same pattern as other sultanate cities. This finding complemented the previous experts' statements (Adrisijanti, 2000) that the urban layout model in Java continued to the Islamic sultanate subordinate town. Semarang has similarities in the city layout consisting of the north-south imaginary axis and the elements of a city center. Such as the government office, the alun-alun, the mosque, the market, the settlements based on ethnicity (Tribinuka 2014). Besides Semarang, the distribution of the same city model in several cities in Java becomes an opportunity for further research. That city patterns continued from the Majapahit Kingdom to the Islamic Sultanate and Islamic Mataram Sultanate that was established after the era of the Demak Sultanate. Changes in rulers continue to carry the principles of urban planning in the previous leadership era. While sustaining the city pattern of the Demak Sultanate in Surakarta and Yogyakarta was based on the succession of sultans, the sustainability Demak sultanate pattern in Semarang was due to regional expansion of Islamic teachings. The method for unwrapping old Semarang by using the traditional city center pattern of Java, field surveys, and investigations of old Semarang maps, pictures, and sketch drawing, revealed that the alun-alun had an imaginary North-South axis. There are limited maps and information in the 15th-century era when the city of Semarang was founded. So, there are no old maps have been found before the colonial period in the 17th century. This limitation is covered by comparing old maps in other cities such as Banten and Cirebon. The disappearance of the visual continuity of the northern part of the axis toward the alun-alun and exacerbated by environmental degradation still raises the potential for city conservation with a sustainable city history. The concept of the North-South axis as the main gate of waterfront city and as a multi-ethnic shop house (Rukayah et al. 2018a), which was once victorious as a commercial center in Semarang in the 1950s-1970s, could become a revitalization strategy such as the village revitalization project Glam and Chinatown in Singapore. The northern part of the axis as the historical streetscape should be considered to improve social and economic development, especially in the tourism industry (Keyvanfar et al. 2018). Recently, preserving the historical, cultural heritage has been challenging with its local originality and identities (Yald, Ayd, and Büyük 2014). Conserving and presenting the identity of the Northern Part of the axis of a

city will reflect the civic pride of its people (Rukayah and Abdullah 2019). We should emphasize the importance of studying traditional urban patterns to search for a city's architectural identity. History has recorded the golden age of the Majapahit Kingdom with its complex urban planning. This advanced planning was able to sustain through the Islamic Sultanate era and subordinate city of sultanate city. Furthermore, the traditional design of a Javanese city with its spatial concept of the North-South axis presents the Javanese power in the deepest circle (Lombard 2005). It would be regrettable if such complex Javanese urban planning disappeared. Thus, the next generation should preserve and contextualize it. It will help urban design planning for the future based on the city's history. The [challenge for architects, urban designers, planners, policymakers, legislators, and all parties involved](#) is to recognize [the](#) importance [of](#) urban identity to formulate and implement policies on its sustainability (Boussaa 2017). The existence of a continuation of the concept and model of cities (the concept of the grid pattern and north-south axis) in Java from the Majapahit kingdom era, the Islamic sultanate, and the subordinate city of the Islamic sultanate provide further research opportunities. There are other phenomena that this concept continued in the colonial era when redesigning cities along the Postweg line. Until now, there has been no analysis of sustainability up to that era. Besides, there has been no further research on the relationship between traditional cities in Indonesia and old cities in the world that also have the same pattern, such as in China. It can be a research opportunity for international cooperation. The sea silk route connected Java and China, and the world maritime routes carried out by traders from China, Admiral Cheng Ho's journey to several cities in Java. (Yuanzhi 2000). Java is assumed to have adopted this concept and layout (Damuri 2014). This next research needs collaboration between architects, urban planners, and archaeologists.

Acknowledgments The authors would like to pay their special regards to all key persons for their constructive feedbacks. This research was conducted within the framework of 'Uncovering the Morphology of Old Semarang City' [International Publication Research 2016-2018 contract number 474-105/UN7.P4.3/PP/ 2018](#). The authors would [also express their gratitude to the Ministry of Research and Technology and the Research and Community Services of Diponegoro University](#) for the given financial supports applied research with the funding research from 2019-2021 with the contract number 474-105/UN7.P4.3/ PP/2019, contract number 257-91/UN7.6.1/PP/2020 and contract number 257-91/UN7.6.1/PP/2021. [Disclosure statement No potential conflict of interest was reported by the author\(s\).](#) [Funding This work was supported by the Collaboration Research NWO WORTO Netherlands and DIKTI Indonesian \[W 07.501806\]; Ministry of Research and Technology and the Research and Community Services of Diponegoro University \[474-105/UN7.P4.3/PP/2019 and No Contract: 257-91/U\]; Universitas Diponegoro International Publication Research 2016-2018 \[257-91/UN7.6.1/PP/2020\].](#) - type="query" rid="Q0004" icoretag="xref" hashtml="true"> Notes on contributors R. Siti Rukayah MT actively as architecture lecturer at the Faculty of Engineering Diponegoro University. In 2012-2016, she served as the Secretary of the Master's Degree of Architecture. In 2016-2021, she serves as the secretary of Doctor's Degree of Architecture Science. She active as a researcher with focusing on the fields of history and conservation of architecture and the design of coastal cities. In 2018, she officially established the Center of Architectural and Coastal Cities Studies which is joined by researchers from the marine sciences and cultural sciences. She has received several overseas grants such as Sumitomo Foundation 2013, NWO-WORTO (Netherlands), and DIKTI (Indonesia). Shabrina Adine Vania Graduated from Architecture Departement Engineering Faculty Universitas Diponegoro, Semarang, Central Java, Indonesia at 2019. He completely finished Seminar about Countermeasures for Fire Hazards in Buildings (2018). The Final Assignment: Resort and Agro tourism Design in Rawa Pening Area (2019). Currently she works as lecturer assistance in Architecture Department and also working as junior architect in Sketsa Consultant. Muhammad Abdullah, MA Since 1987 he has been a teaching staff at the Faculty of Letters UNDIP in the specifications of philology studies, pesantren literature, and Islamic Cultural History. He is completing the writing of his S-3 dissertation entitled Theological Struggle Asy'ariyah and Rationalists in Durrah Al-Fara'id by Nuruddin Ar-Raniri, at FIB UI Depok. The books he has written are Paham Wahdah Al-Wujud Abdurrauf As-Singkili, the publisher of Bendera Semarang (1999); Hacking Ziarah, Profile of Syawalan Kaliwungu (2004), Questioning the City of Santri Kaliwungu (ed.) In 2003. Deconstruction of Pesantren Literature (2007), Khasanah of Coastal Literature (2016), Coastal Literature Studies (2018), Introduction to Philology (2019), Translations Durrat al Daraid (2019). ORCID R. Siti Rukayah <http://orcid.org/0000-0002-6252-9394> References [Abidin, H. Z., H. Andreas](#), Y. F. Land, [T. P. Sidiq](#), I. Gumilar, I. Gumilar, T. P. Sidiq, et al.

2013. "Land Subsidence in Coastal City of Semarang (Indonesia): Characteristics, Impacts and Causes." *Geomatics, Natural Hazards and Risk* 4 (3): 226-240. 5705. doi:10.1080/19475705.2012.692336. Adrisijanti, I. 2000. *Arkeologi Perkotaan Mataram Islam*. Yogyakarta: Jendela. Andrisijanti, I. 2015. "Pengembangan Maket Pusat-Pusat Pemerintahan." *Nosarara: Jurnal Pendidikan dan Ilmu Sosial* 1 (1): 1-29. Arianto, R. A. 2013. "Perubahan Tata Ruang Dan Sosial Di Alun-Alun Semarang Tahun 1967-1972." *Indonesian Journal of History Education* 2 (2): 1-6. Australian ICOMOS Inc, 2012. *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance*. 1-10. Boussaa, D. 2017. "Urban Regeneration and the Search for Identity in Historic Cities." *Sustainability* 10 (48): 1-16. doi:10.3390/su10010048. Brommer, B., A. Sidharta, E. Budihardjo, A. Siswanto, A. B. Montens, S. S. Soewarno, and T. Stevens. 1995. *Semarang, Beeld van een stad (Semarang, Image of a city)*. Asia Maior. Cahyono, C. 2018. "Warak Ngendog Dalam Tradisi Dugderan Sebagai Representasi Identitas Muslim Urban Di Kota Semarang." *Jurnal Theologia* 29 (2): 339-362. doi:10.21580/teo.2018.29.2.2937. Colombijn, F. 2012. "Modernization of the Indonesian City, 1920 - 1960." *Barlow* 1-26. doi:10.1163/9789004280724. Damayanti, R. 2005. "Kawasan Pusat Kota Dalam Perkembangan Sejarah Perkotaan Di Jawa." *Dimensi Teknik Arsitektur* 33 (September): 34-42. doi:10.9744/dimensi.33.1. Damayanti, R. 2016. "Kawasan 'pusat kota' dalam Perkembangan Sejarah Perkotaan Di Jawa." *Dimensi* 33 (1): 0126-219X. doi:10.9744/dimensi.33.1.%phttps://dimensi.petra.ac.id/index.php/ars/article/view/16274 Damuri, Y. R. 2014. "A Maritime Silk Road and Indonesia 's Perspective of Maritime State." Jakarta: Centre for Strategic and International Studies. https://www.csis.or.id/uploads/attachments/post/2019/01/10/a_maritime_silk_road_and_indonesia_s_perspective_of_maritime_state.pdf De Graaf, H. J., and T. G. T. Pigeaud. 1985. Graaf de H.J And Pigeaud. 1985. *Kerajaan-kerajaan Islam Di Jawa. Peralihan Dari Majapahit Ke Mataram*. Jakarta: Pustaka Utama Grafiti dan KITLV. (first published 1974). Dinas Perdagangan Kota Semarang. 1956. *Perdagangan Kota Semarang*. Semarang: Bakoenoen. Erlani, R., and W. H. Nugrahandika. 2019. "Ketangguhan Kota Semarang Dalam Menghadapi Bencana Banjir Pasang Air Laut (Rob)." *Journal of Regional and Rural Development Planning* 3 (1): 47. doi:10.29244/jp2wd.2019.3.1.47-63. Evers, H.-D. 2016. "Nusantara: History of a Concept." *Journal of the Malaysian Branch of the Royal Asiatic Society* 89 (1): 3-14. doi:10.1353/ras.2016.0004. Farhan, S. L., M. G. Abdelmonem, and Z. A. Nasar. 2018. "The Urban Tranformation of Traditional City Centres : Holy Karbala as a Case Study." *Archnet-IJAR: International Journal of Architectural Research* 12 (3): 53-67. doi: 10.26687/archnet-ijar.v12i3.1625. Fauziyah, S. 2012. "Pasar Pada Masa Kesultanan Islam Banten." 86 *ThaqÃfiyyÃT* 13 (1): 1-10. Juni 2012, Lcd. Freestone, R., S. Marsden, and C. Garnaut. 2014. "A Methodology for Assessing the Heritage of Planned Urban Environments : An Australian Study of National Heritage Values." *International Journal of Heritage Studies* 14 (October 2014): 37-41. doi:10.1080/13527250701844043. Gomperts, A., A. Haag, and P. Carey. 2010. "Rediscovering the Royal Capital of Majapahit." International Institute for Asian Studies. Graham, E. 1996. "Maya Cities and the Character of a Tropical Urbanism." *The Development of Urbanism from a Global Perspective*. Accessed 14 September 2015. http://www.uu.se/digitalAssets/9/a_9652-f_GrahamAll.pdf Guan, T. C. 2011. *Learning From The Singapore Shophouse: Towards A Sustainable Tropical Architecture*. Florida: University of Florida. Guillot, C., L Nurhakim, and W. Sonny. 1997. *Banten Sebelum Zaman Islam Kajian Arkeologi Di Banten Girang 932-1526*. Indonesia: Pusat Arkeologi Nasional. Gunawan, S. R., S. Nindyo, I. Ikaputra, and S. Bakti. 2013. "Colonial and Traditional Urban Space in Java: A Morphological Study of Ten Cities." *DIMENSI (Journal of Architecture and Built Environment)* 40 (2): 77-88. doi:10.9744/ dimensi.40.2.77-88. Hadi, S. P. 2017. "In Search for Sustainable Coastal Management : A Case Study of Semarang, Indonesia." *IOP Conf. Series: Earth and Environmental Science* 55 (2017): 12054. doi:10.1088/1742-6596/755/1/011001. Hakala, U., P. Sjöblom, and S. P. Kantola. 2015. "Toponyms as Carriers of Heritage: Implications for Place Branding." *Journal of Product and Brand Management* 24 (3): 263-275. doi:10.1108/JPBM-05-2014-0612. Handinoto. 1992. "Alun-Alun Sebagai Identitas Kota Jawa, Dulu Dan Sekarang *Dimensi* 18 September " 1-15. September. Handinoto, and S. Hartono. 2007. "Jogjakarta And Cakranegara." International Seminar The Knowledge City: Spirit, Character, and Manifestation 13-14 November 2007. Departement of Architecture University of Sumatera Utara: Sumatera Utara. 1-11. Hartono, S. 2005. "Alun-alun Dan Revitalisasi Identitas Kota Tuban." *Dimensi Teknik Arsitektur* 33 (1): 131-142. Hendro, E. P. 2014. "Perkembangan Morfologi Kota Cirebon Dari Masa Kerajaan Hingga Akhir Masa Kolonial." *Paramita* 24 (1): 17-30. Homburg, J. A., J. D. Windingstad, and D. Beery. 2012. "Assessing Coastal

Landscape Change for Archaeological Purposes : Integrating Shallow Geophysics, Historical Archives and Geomorphology at Port Angeles."

Archaeological Prospection, August. doi:10.1002/arp. Hutama, S. D. 2018. "A Study of Historical Transformation of North Coastal Cities in Java A Study of Historical Transformation of North Coastal Cities in Java." Journal of Asian Architecture and Building Engineering 7581. doi:10.3130/jaabe.2.183.

Junianto, H. W. 2019. "Konsep Mancapat-Mancalima Dalam Struktur Kota Kerajaan Mataram Islam. Periode Kerajaan Pajang Sampai Dengan Surakarta." Mintakat: Jurnal Arsitektur 20 (2): 234–253. doi:10.26905/mj. v20i2.3987. <http://jurnal.unmer.ac.id/index.php/jam/arti cle/view/3987>

Kalman, H. 2017. "Destruction, Mitigation, and Reconciliation of Cultural Heritage." International Journal of Heritage Studies 23 (April): 539–555. doi:10.1080/13527258.2017.1289475.

Karsono, B. 2008. "Imaginary Axis as a Basic Morphology in the City of Yogyakarta – Indonesia." Yogyakarta: Issue 2nd International Conference On Built Environment In Developing Countries (ICBEDC 2008).

Keyvanfar, A., A. Shafaghat, S. Mohamad, M. Abdullahi, H. Ahmad, N. Hidayah, M. Derus, and M. Khorami. 2018. "A Sustainable Historic Waterfront Revitalization Decision Support Tool for Attracting Tourists." Sustainability 10 (215): 1–23. doi:10.3390/su10020215.

Kuntowijoyo. 1994. Metodologi Sejarah. Yogyakarta: Tiara Wacana.

Lombard, D. 2005. Nusa Jawa Silang Budaya. Jakarta: Gramedia Pustaka Utama.

Miladan, N. 2016. "Communities' Contributions to Urban Resilience Process: A Case Study of Semarang City (Indonesia) toward Coastal Hydrological Risk." Architecture, space management. Université Paris-Est.

Mohamed, A., and N. R El-saqqa. 2011. "Urban Space in Historic City Centers : The Search for Genius-Loci in Palestine Square, Gaza City." In International Conference of Architectural Conservation (3rd ICAH) 9 February 2019, Aswan, Egypt. 2015: 1–15. Gaza: Islamic University-Gaza.

Muljana, S. 2005. Runtuhnya Kerajaan Hindu-Jawa Dan Timbulnya Negara-negara Islam Di Nusantara. Yogyakarta: LkiS.

Mulyadi, L. 2014. "Review on Main Characteristic of Historical City as an Urban Design Alternative : A Case Study in Cakranegara City, Indonesia." International Review for Spatial Planning and Sustainable Development 2 (4): 1–15. doi:10.14246/irspsd.2.4_30. https://www.jstage.jst.go.jp/article/irspsd/2/4/2_30/_article

Ostermann, O., A. P. Perdana, and F. O. Ostermann. 2018. "A Citizen Science Approach for Collecting Toponyms." International Journal of Geo-Information 7: 2–18. doi:10.3390/ijgi7060222.

Permana, R. C. E. 2004. "Kajian Arkeologi Mengenai Keraton Surosowan Banten Lama, Banten." Makara, Sosial Humaniora 8 (3): 112–119. Vol. 8, No. 3, Desember 2004: 112-119.

Pole, C, J. 2004. In Seeing Is Believing? Approaches To Visual Research 7: 190. London: Elsevier Ltd.

Pratiwo, P. N. 2002. "Java and de Groote Postweg, La Grande Route, the Great Mail Road, Jalan Raya Pos." Radiation Research 158 (6): 707–725. doi:10.1667/0033-7587(2002) 158[0707:iotari]2.0.co;2.

Prayitno, B., and Q. Qomarun. 2007. "Morfologi Kota Solo (Tahun 1500-2000)." DIMENSI (Jurnal Teknik Arsitektur) 35 (1): 80–87. doi:10.9744/dimensi.35.1.pp.80-87.

Priyantoko, R. Y. 2010. "Alun-alun di Pusat Kota Gementee di Pesisir Utara Jawa Pada Awal Abad XX Masehi." Fakultas Ilmu Pengetahuan Budaya Program Studi Arkeologi.

Rahardjo, S. 1997. Kota Demak Sebagai Bandar Dagang Di Jalur Sutra. Jakarta : Depdikbud.

Reeder-myers, L. A. 2015. "Cultural Heritage at Risk in the Twenty- First Century : A Vulnerability Assessment of Coastal Archaeological Sites in the United States." Journal Of Island & Coastal Archaeology 2015: 1–10. June. doi:10.1080/15564894.2015.1008074.

Roesmanto, T., and D. Iswanto. 2018. "Pelestarian Ke-Nusantara-an Alun-alun Di Jawa." Temu Ilmiah Ikatan Peneliti Lingkungan Binaan Indonesia IPLBI: 15–23. doi:10.32315/ti.7.h015.

Rukayah, R. S., B. Malik, and A. Malik. 2012. "Between Colonial, Moslem, and Post-Independence Era, Which Layer of Urban Patterns Should Be Conserved?" Procedia - Social and Behavioral Sciences 68: 775–789. doi:10.1016/j.sbspro.2012.12.266.

Rukayah, R. S., D. R. Puguh, E. S. Susilo, and M. S. Indraswara. 2018a. "Local Wisdom of the Native Settlement as A Main Gate in the Northern Axis of Javanese City Center in Semarang." IOP Conference Series: Earth and Environmental Science 152 (1). doi:10.1088/1755-1315/ 152/1/012032.

Rukayah, R. S., E. S. Susilo, and M. Abdullah. 2018. Semarang Kota Pesisir Lama. Yogyakarta: Tekno Sain.

Rukayah, R. S., E. S. Susilo, M. Abdullah, and S. Saputro. 2018b. "Exploring the Position of Old Semarang Sea Port: Based on Javanese City Pattern." IOP Conference Series: Earth and Environmental Science 116 (1): 8. doi:10.1088/1755-1315/ 116/ 1/012036.

Rukayah, R. S., and M. Abdullah. 2019. "The Glory Of Semarang Coastal City In The Past, Multi - Ethnic Merchants And Dutch Commerce." Journal Of Southwest Jiaotong University 54 (6). doi:10.35741/0258- 2724.54.6.42.

Rukayah, R. S., P. D. Respati, and S. E. S. Susilo. 2016. "Morphology of Traditional City Center in Semarang: Towards Adaptive Re- Use in Urban Heritage." Environment-Behaviour Proceedings Journal 1 (4): 109–118. doi:10.21834/e-bpj.v1i4.91.

Rukayah, R. S., T. Roesmanto, and S. Sukawi. 2013. "The Sustainability

[Concept of Alun-alun as a Model of Urban Design in the Future." *Procedia - Social and Behavioral Sciences* 85: 626–637. doi:10.1016/j.sbspro.2013.08.390.](#) Rukayah, R. S., W. A. Syafei, M. Abdullah, and A. Etenia. 2021. "The Diversity of Multi-ethnic Dutch Area Corridors Leading to the City Square of Semarang, Indonesia." *ISVS E-Journal* 8 (1): 1–22.

[Rukayah, R. S. 2010. "Simbiosis Di Ruang Terbuka Kota Simpang Lima Di Kota Semarang Simbiosis Di Ruang Terbuka Kota Simpang Lima Di Kota Semarang." Phd Disertation, not published.](#) [Smith, M. E. 2003. "Can We Read Cosmology In Ancient Maya City Plans ? Comment On Ashmore And Sabloff." *Latin American Antiquity* 14 \(2\): 221–228. doi:10.2307/3557597.](#) [Smith, M. E. 2007. "Form and Meaning in the Earliest Cities: A New Approach to Ancient Urban Planning." *Journal of Planning History* 6 \(1\): 3–47. doi:10.1177/1538513206293713.](#) Soedarsono, S. 2012. "Kondisi Geologi Dan Geomorfologi Kaitannya Dengan Degradasi Lingkungan Di Kota Semarang (Geology and Geomorphology Condition Related to Environmental Degradasi in Town Semarang)." [Jurnal Lingkungan Sultan Agung](#) 1 (1): 29–41. [Sprajc, I. 2009. "Astronomical and Cosmological Aspects of Maya Architecture and Urbanism." *Astronomical Society of the Pacific Conference Series*. 409: 303–314.](#) [Takagi, H., D. Fujii, M. Esteban, and X. Yi. 2017. "Effectiveness and Limitation of Coastal Dykes in Jakarta: The Need for Prioritizing Actions against Land Subsidence." *Sustainability* 9 \(4\): 619. doi:10.3390/su9040619.](#) [Talens, J 1993 *Ritual Power : The Instalation of a King in Banten, West Java, in 1691* Bijdragen tot de taal-, land- en volken- kunde / *Journal of the Humanities and Social Sciences of Southeast Asia* 149 <http://www.kitlv-journals.nl>](#) Tio, J 2002 Winatayuda, Victor S. Kota Semarang dalam kenangan (Semarang: Sinar Indonesia) 137 Toer, P. A. 2005. [Jalan Raya Pos, Jalan Daendels. Jakarta: Lentera Dipantara](#). Tribinuka, T. 2014. "Rekonstruksi Arsitektur Kerajaan Majapahit Dari Relief, Artefak Dan Situs Bersejarah." In Temu Ilmiah IPLBI 2014 11-12 November 2014. 19–24. Indonesia: Ikatan Peneliti Lingkungan Binaan Indonesia Palembang. [Van Bemmelen, R. 1949. *Geology of Indonesia*. The Hague: Government Printing Office.](#) Van Roosmalen, P. K. M. 2011. ["Designing Colonial Cities : The Making of Modern Town Planning in the Dutch East Indies and Indonesia 1905-1950](#) Demands in Terms of Hygiene, Infrastructure, Confrontation of Administrators with Local Issues : Together These Provided a Prolific Setting." *The Newsletter*. Wahda, A. N. 2015. "Sejarah Singkat Kesultanan Banten: Abad XVI-XIX." April. [Wessing, Robert 1992 *A Tiger in The Heart : The Javanese Rampok Macan* <http://www.kitlv-journals.nl> 148 <http://www.kitlv-journals.nl>](#) [Wiryomartono, A. B. P. 1995. *Seni Bangunan Dan Seni Bina Kota Di Indonesia*. Jakarta: PT. Gramedia Pustaka.](#) Yald, E., D. Ayd, and S. Büyüç. 2014. ["Loss of City Identities in the Process of Change : The City of Konya Turkey." *Procedia - Social and Behavioral Sciences* 140: 221–233. doi:10.1016/j.sbspro.2014.04.413.](#) [Yeoh, B. S. A., L. Kong, B. S. A. Yeoh, and L. Kong. 2012. "Singapore S Chinatown : Nation Building and Heritage Tourism in a Multiracial City." *Localities* 2: 117–159. doi:10.14246/IRSPSD.2.4_30.](#) Yuanzhi, K. 2000. Cheng Ho Muslim Tionghoa. Misteri Perjalanan Muhibah Di Nusantara. Jakarta: Yayasan Pustaka Obor Indonesia. Yuliati, D. 2014. "Strengthening Indonesia [National Identity through History Semarang as a Maritime City : A Medium of Unity in Diversity](#)." *Global Journal of Human-Social Science History Archaeology & Anthropology* 14 (1): 38–46. 2 R. S. RUKAYAH [ET AL. JOURNAL OF ASIAN ARCHITECTURE AND BUILDING ENGINEERING](#) 3 4 R. S. RUKAYAH [ET AL. JOURNAL OF ASIAN ARCHITECTURE AND BUILDING ENGINEERING](#) 5 6 R. S. RUKAYAH [ET AL. JOURNAL OF ASIAN ARCHITECTURE AND BUILDING ENGINEERING](#) 7 8 R. S. RUKAYAH [ET AL. JOURNAL OF ASIAN ARCHITECTURE AND BUILDING ENGINEERING](#) 9 10 R. S. RUKAYAH [ET AL. JOURNAL OF ASIAN ARCHITECTURE AND BUILDING ENGINEERING](#) 11 12 R. S. RUKAYAH [ET AL. JOURNAL OF ASIAN ARCHITECTURE AND BUILDING ENGINEERING](#) 13 14 R. S. RUKAYAH [ET AL. JOURNAL OF ASIAN ARCHITECTURE AND BUILDING ENGINEERING](#) 15 16 R. S. RUKAYAH ET AL.