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Journal of Applied Environmental and Biological Sciences (JAEBS) is a peer reviewed, open access international scientific journal dedicated for rapid publication of high quality original research articles as well as review articles in the all areas of Applied Environmental and Biological Sciences.

Scope

Journal of Applied Environmental and Biological Sciences (JAEBS) is devoted to the monthly publication of research papers of outstanding significance in the all fields of environmental sciences, environmental engineering, environmental Pollution, green chemistry, environmentally friendly synthetic pathways, alternatively fuels, environmental analytical chemistry, biomolecular tools and tracers, water and soil, environmental [management, economics, humanities], Mathematics, multidisciplinary aspects such as Business Management, Organizational Behavior, all areas of biological sciences, including cell biology, developmental biology, structural biology, microbiology, molecular biology & genetics, biochemistry, biotechnology, biodiversity, ecology, marine biology, plant biology, bioinformatics, toxicology, developmental biology, structural biology, microbiology, molecular biology & genetics, biotechnology, biodiversity and related fields. The journal presents the latest developments in the fields of environmental social marketing, environmental journalism, environmental education, sustainability education, environmental interpretation, and environmental health communication.

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Table of Contents, June 2019

Zia Ur Rehman, Sadia Naz

Sense of Good Citizenship among University Graduates: Pakistani Perspective

J. Appl. Environ. Biol. Sci. 2019 9(6): 1-8. [\[Abstract\]](#) [\[Full-Text PDF\]](#)

Rahadhian P. Herwindo

Identification of Spatial Pattern in *Pakungwati* as a Reflection of Architectural Transformation between Hindu-Buddhist and Islamic Palace in Jawa

J. Appl. Environ. Biol. Sci. 2019 9(6): 9-16. [\[Abstract\]](#) [\[Full-Text PDF\]](#)

Abdul Hamid

Physical-Chemical Remediation of Oil-Polluted Sea Waters

J. Appl. Environ. Biol. Sci. 2019 9(6): 17-19. [\[Abstract\]](#) [\[Full-Text PDF\]](#)



Sense of Good Citizenship among University Graduates: Pakistani Perspective

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ABSTRACT

Institutions of higher education are offering citizenship education around the World. But still, civic education has been least researched area in Pakistan. Therefore to look into this problem the present study was conducted with an objective; to explore the characteristics of good citizenship among university graduates. For the collection of research data, survey research method was adopted, with a questionnaire and 1500 Master level graduates were chosen as sample of the study from 15 public/private universities of Pakistan. Data analysis (i.e. percentage, mean & chi-square) reflected the findings i.e. university students were significantly in support to develop civic professionalism, tolerance/acceptance, patriotism, civic knowledge and understanding. They like to acquire and maintain professional competence; they want to know and respect existing laws pertaining to country and professional work. Majority of graduates were compassionate/kind with other society members; they liked to take part in discussions and debates, conflict resolution and participating in community. A substantial number of graduates respect others' dignity and property; acknowledge the importance of vote and have firm faith in welfare of their country. It may feasible to integrate the citizenship education like a requisite segment of the curriculum from basics to the higher levels of educational system.

KEY WORDS: Citizenship, Sense of Citizenship, Civic Characteristics, Civic Education, University Graduates.

INTRODUCTION

Citizenship and civic attributes are the foremost components of a superior human life. Citizenship is like specification of becoming functional through human rights, tasks and professional errands like an associate of a community or a country. It is relating to solicit about ourselves that what is our individuality and how we use up our time jointly; along with the categories of citizens that we like to build up as our forthcoming youth (Gearon, 2015).

The good attributes of the citizenship are the trainings of the students which they have to share within the public and society. Instead of inserting citizenship education into different courses /subjects/syllabus in which citizenship is shown as fixed and explicit subject matter, it needs to be highlighted like an essential foundation of education in the entire courses at all educational stages (Elms, 2011).

Further, Johnson (2016) has described different regions of citizenship and civic attributes as: civic education, civic learning, civic responsibility for the students to become conscious of their duties and privileges; encourage and grow students; support students to play an effectual function in the public by ensuring that they can contribute in energetic civic actions, in addition to be careful about their life, neighborhood, culture and the wide globe.

Similarly, Pring (2016) indicated that contribution of universities to citizenship with civic characteristics is particularly enormous than that to the production of common public. Foundation of higher education develops the maintenance and growth of society that raise the capital which assist us to conceptualize the awareness of citizenship. Institutions of higher education also make input to citizenship through their work in the education and training of professionals whose responsibilities is citizenship advancement, most notably faculties (Davies, 2006). These institutions of higher education are also large corporate actors within public own local communities and this generates expectations and duties with respect to good citizenship behavior (Delanty, 2001). Additionally Fowler and Blohm (2011) added that the university education have a vital function in association to the educated as well as technical citizenship. Educated citizenship reflects social responsibility for higher institutions and technical

citizenship equip the institutions with civic business, civic equipments and advertised powers related to citizenship (Delanty, 2000).

Civic responsibility is the responsibility of a citizen. It includes participation in government, place of worship, volunteers and memberships of voluntary associations (Gabelnick, 2011). By engaging in civic responsibility, citizens ensure and uphold certain democratic values written in the country's constitution and the Bill of Rights. Those values or duties include justice, freedom, equality, diversity, authority, privacy, property, participation, truth, patriotism, human rights, rule of law, tolerance, mutual assistance, self-restraint and self-respect (Vernon, 2010); and according to Sullivan (2003) to practice one's profession in a public with full and direct sense, professionals must view themselves as active participants in civic life. They must cast their identities, roles, and expertise around a democratic public mission, suffusing their technical competence with civic awareness and purpose.

Every person of every religion has an obligation to uphold the meaning of tolerance. In fact, tolerance is a major belief within religion; however, it is not always practiced. Many people within many religions have, throughout history, and continue to this day, practiced intolerance in order to gain personal or secular power. No Muslim, no Jew, no Christian, no Hindu, no Buddhist, no one who is true to the principles of any of the world's faiths, no one who claims a cultural, national or religious identity based on values such as truth, decency and justice can be neutral in the fight against intolerance (United Nations Information Service, 2004).

Similarly, Neufeldt (2012) signified tolerance as "identifying and regarding other's beliefs and practices without giving out in them. Being tolerant of each other and caring for each other is what makes us human. By teaching tolerance, we allow individuality and diversity while promoting peace and a civil society. Our success in the struggle of intolerance depends on the effort we make to educate ourselves and our children. Intolerance can be unlearned. Tolerance and mutual respect have to be learnt"

Acceptance goes a step beyond tolerance. For example, Green (2010) indicated that when a son or daughter tells a parent about an unwelcome career choice or marital partner etc, he or she wants that information not just to be tolerated but to be accepted. There is a third concept: understanding that is a psychological process related to an abstract or physical object such as a person, situation or message whereby one is able to think about it and use concepts to deal adequately with that object.

Civic knowledge helps citizens understand their interests as individuals and as members of groups. The more knowledge we have, the better we can understand the impact of public policies on our interests, and the more effectively we can promote our interests in the political process (Lisman, 2012). Political knowledge fosters citizens' "enlightened self-interest" the ability to connect personal/group interests with specific public issues and to connect those issues with candidates who are more likely to share their views and promote their interests. Political knowledge, then, is key determinant of instrumental rationality (Shils, 2013).

In the same way Fuller (2008) explained that citizenship knowledge and understanding increases the consistency of views across issues and across time. General civic knowledge can alter our views on specific public issues. For example, the more knowledge citizens have about civic matters, the less likely they are to fear new immigrants and their impact on our country. Civic education helps to provide pupils with knowledge, skills and understanding to prepare them to play a full and active part in society. In particular citizenship education should foster students' keen awareness and understanding of democracy, government and how laws are made and upheld. It should also prepare students to take their place in society as responsible citizens, manage their money well and make sound financial decisions (Ornstein, 2016).

Citizenship morality/honesty/courtesy is about what the right and wrong behavior; closely linked with trust; and a polite behavior that shows respect for other people, respectively. A civic morality gives clarity of action that one can hope to build a better society (Vernon & Tomas, 2010). By civic morality means that our education about the patterns of history, systems of power and agency gained through research or creative activity should morally bound to serve the community (Morse, 2007). Another important factor is that both academia and community should develop a citizenship morality because in helping the society, academics develop an understanding within the society i.e. university and its academics as accountable to the community. The affiliation as well as the effort must be jointly edifying (Dean, 2011).

One of the most important civic attribute is patriotism and according to Smith (2002) "it is a special affection for one's own country or a special concern for the wellbeing of the country including a sense of personal identification with the country. Patriotism is the awareness of our moral duties to the political community while nationality is our connection with the race that is merely natural or physical. It is an emotional attachment to a nation which an individual recognizes as their homeland. This attachment also known as national feeling or national pride can be viewed in terms of different futures relating to one's own nation including ethnic, cultural, political or historical aspects."

“Citizenship accountability/critical thinking mean ensuring that officials in public, private and voluntary sector organizations are answerable for their actions. In ethics and governance, accountability is answerability, blameworthiness, liability and the expectation of account giving” (Goetz & Jenkins, 2005); while “civic participation in social science refers to different mechanisms for the public to express opinions and ideally exert influence regarding political, economic management or other social decisions. Youth participation in civic activities has been found to be linked to students’ race, academic track and their institutions socioeconomic status” (Gearon, 2015).

For the purpose of improving the most notably neglected areas of citizenship education Fowler and Blohm (2011) specified that a systematic and complete adult civic learning strategy would follow among others, the subsequent foremost objectives as: provision of incentives in favor of grown-up contribution; comprehensiveness of contributions; individual advancement and family management; citizenship and peace learning; entrepreneurship education; civic literacy; content and pedagogy quality and appraisals.

In the light of above statements it is clear that citizenship and civic characteristics are the leading components of an advanced human life. Most of the universities and institutions have citizenship education and a lot of researches have also been conducted worldwide. But in our country Pakistan, still there is a lack of study/research about civic education and its characteristics at university level. Also it has been unexplored how do the university graduates rate themselves about consciousness and practice of citizenship; and how do the universities offer plans to indoctrinate the characteristics of good citizenship among graduates.

Therefore, it was very important to carry out a research regarding civic knowledge and understanding with practices of sense of good citizenship among university graduates in Pakistan.

Objective and Question

This study was conducted to measure the sense of good citizenship among university graduates: Pakistani perspective with an objective as (i) to explore the characteristics of good citizenship among university graduates. A resulting question was also formulated as (i) what characteristics of good citizenship exist among university graduates?

Due to limited time frame and economic conditions and linked restrictions, the research was delimited to (i) two provinces of Pakistan (i.e. the universities situated in Khyber Pakhtunkhwa and Punjab; including Federal as well as Northern Areas (ii) only Master level university students of 3rd/4th semester.

The present research highlights merits and demerits among graduates concerning the characteristics of good citizenship, and also specifies the development of universities about the promotion of civic education in graduates. According to Gearon (2015) the research findings will be beneficial for universities’ administrators, faculties and planners of higher education. By these findings university faculty and administration may attempt to remove deficiencies related to citizenship characteristics, and extend citizenship programs. Furthermore, this research may release newest prospects for researchers working in the area of citizenship programs as well as human capitals.

METHODOLOGY

The present research was carried out to explore sense of good citizenship among university graduates: Pakistani perspective. Following steps were followed to accomplish this purpose;

Population

Population of this study was consisted of all the Master level graduates of the universities of Punjab and Khyber Pakhtunkhwa province of Pakistan. There were 44250 Master level graduates within 103 Universities (public/private) in Punjab and Khyber Pakhtunkhwa together with Federal and Northern areas of Pakistan, from which sample of the study was chosen.

Sample

“A multistage stratified random sampling technique was adopted to get a suitable sample from population. Total population was separated into two parts as: the province of the Punjab with Federal Capital Area (Islamabad) and the province of Khyber Pakhtunkhwa with Northern Areas (Gilgit Baltistan). 1500 Master level graduates of the 15 selected universities i.e. 100 students from each university were selected for research”.

Instrument

A questionnaire is well thought-out the heart of survey study (Saravanel, 2011). For the collection of research data concerning the exploration of the characteristics of good citizenship among university graduates, a

questionnaire having like 5 point Likert scale (citizenship attribute scale) was developed for Master level graduates. In support of this instrument, after passing through pilot testing and experts' opinions, the entire necessary modifications were worked out and then finally passed through judgmental validation and was used for more succession.

Data Collection

"Research data was collected by visiting the sampled institutions/departments and administered the questionnaire to the respondents. The respondents were asked to go through the suitable technique as to carefully think each statement and cautiously mark the answer sheets. The cooperation and sincerity of the respondents made it possible to get a hundred percent return rate of the instrument."

Analysis

"Collected data was set and tabularized i.e. for the numerical analysis of data; SPSS (Statistical Package for Social Sciences) were used; as percentage, arithmetic mean, frequency and chi-square were used. Analysis of data reflected complete results of the research. These results were used to explore the findings as well as the conclusions of the research."

RESULTS

"The attributes of good citizenship have been analyzed as the respondents were given a questionnaire like five point Likert scale (i.e. Always, Mostly, Sometimes, Rarely, Never) to respond according to their practices. For this analysis chi-square test (goodness of fit) has been applied and the scores of all respondents with their percentages; mean values are given in the subsequent tables."

Table 1 Social/Professional Responsibility as an Aspect of Citizenship among University Graduates

St.No	Statements	Response					Mean	χ^2
		A	M	S	R	N		
1	As a student I strive to achieve the highest quality, effectiveness and dignity in both the process and products of professional work.	525 (35%)	573 (38%)	271 (18%)	120 (8%)	11 (1%)	3.99	806.4*
2	Being a student I like to acquire and maintain professional competence.	481 (32%)	560 (37%)	321 (21%)	116 (8%)	22 (2%)	3.90	706.5*
3	As a student I want to know and respect existing laws pertaining to professional work.	451 (30%)	588 (39%)	316 (21%)	129 (9%)	16 (1%)	3.89	719.7*
4	Being a student I accept and try my best to provide appropriate professional review.	445 (30%)	599 (40%)	317 (21%)	122 (8%)	17 (1%)	3.89	741.6*
5	As a student I give importance to computer literacy and related skills.	458 (30%)	573 (38%)	307 (21%)	148 (10%)	14 (1%)	3.88	681.5*
6	I wish to honor contracts, agreements and assigned responsibilities.	457 (31%)	556 (37%)	320 (21%)	152 (10%)	15 (1%)	3.86	645.7*
7	Being a student I try to improve public understanding of information and communication technologies (ICTs).	463 (31%)	577 (38%)	310 (21%)	134 (9%)	16 (1%)	3.89	705.4*

Expected Frequency=300

$p=0.000$,

*Significant at 0.05

Table 1 shows the students' social and professional responsibilities as aspects of citizenship. The analysis of statement No.1 shows a significant response ($\chi^2=806.4$, $p<0.05$) of the majority of students (Always=35%, Mostly=38%, and mean=3.99) about strive to achieve the highest quality, effectiveness and dignity in both the process and products of professional work. The analysis of statement No. 2 shows a significant response ($\chi^2=706.5$, $p<0.05$) of the majority of students (Always=32%, Mostly=37%, and mean=3.90) about like to acquire and maintain professional competence. The analysis of statement No.3 shows a significant response ($\chi^2=719.7$, $p<0.05$) of the majority of students (Always=30%, Mostly=39%, and mean=3.89) about want to know and respect existing laws pertaining to professional work. The analysis of statement No.4 shows a significant response ($\chi^2=741.6$, $p<0.05$) of the majority of students (Always=30%, Mostly=40%, and mean=3.89) about accept and try their best to provide appropriate professional review. The analysis of statement No.5 shows a significant response ($\chi^2=681.5$, $p<0.05$) of the majority of students (Always=30%, Mostly=38%, and mean=3.88) about give importance to computer literacy and related skills. The analysis of statement No.6 shows a significant response ($\chi^2=645.7$, $p<0.05$) of the majority of students (Always=31%, Mostly=37%, and mean=3.86) about wish to honor contracts, agreements and assigned responsibilities. The analysis of statement No.7 shows a significant response ($\chi^2=705.4$, $p<0.05$) of the majority of

students (Always=31%, Mostly=38%, and mean=3.89) about try to improve public understanding of information and communication technologies (ICTs).

Table 2 Tolerance and Acceptance as Aspects of Citizenship among University Graduates

St.No	Statements	Response					Mean	χ^2
		A	M	S	R	N		
1	I am trusted because others know who I am: what other see is what they get.	459 (31%)	555 (37%)	332 (22%)	126 (8%)	28 (2%)	3.86	652.0*
2	I try my best to judge others on their character, abilities and conduct without regard to race, religion, gender and livings.	431 (29%)	588 (39%)	275 (18%)	181 (12%)	25 (2%)	3.81	635.1*
3	I am tolerant, respectful and accepting of those who are different from me.	433 (29%)	554 (37%)	339 (23%)	138 (9%)	36 (2%)	3.81	598.9*
4	Being a good student I listen to others and try to understand their points of view.	419 (28%)	654 (43%)	268 (18%)	145 (10%)	14 (1%)	3.88	821.1*
5	As a student I am compassionate, kind, loving and empathetic with other society members.	465 (31%)	566 (37%)	328 (22%)	115 (8%)	26 (2%)	3.89	693.6*
6	I try my best to forgive others for their shortcomings.	435 (29%)	580 (39%)	323 (21%)	144 (10%)	18 (1%)	3.85	670.0*
7	Being a student I resolve disagreements and deal with anger peacefully without violence.	483 (32%)	508 (34%)	351 (23%)	150 (10%)	08 (1%)	3.87	623.7*

Expected Frequency=300

p=0.000,

*Significant at 0.05

Table 2 shows the tolerance as an aspect of citizenship. The analysis of statement No. 1 shows a significant response ($\chi^2=652.0$, $p<0.05$) of the majority of students (Always=31%, Mostly=37%, and mean=3.86) about trusted. The analysis of statement No. 2 shows a significant response ($\chi^2=635.1$, $p<0.05$) of the majority of students (Always=29%, Mostly=39%, and mean=3.81) about try their best to judge others on their character, abilities and conduct without regard to race, religion, gender and livings. The analysis of statement No. 3 shows a significant response ($\chi^2=598.9$, $p<0.05$) of the majority of students (Always=29%, Mostly=37%, and mean=3.81) about tolerant, respectful and accepting of those who are different from them. The analysis of statement No. 4 shows a significant response ($\chi^2=821.1$, $p<0.05$) of the majority of students (Always=28%, Mostly=43%, and mean=3.88) about listen to others and try to understand their points of view. The analysis of statement No. 5 shows a significant response ($\chi^2=693.6$, $p<0.05$) of the majority of students (Always=31%, Mostly=37%, and mean=3.89) about compassionate, kind, loving and empathetic with other society members. The analysis of statement No. 6 shows a significant response ($\chi^2=670.0$, $p<0.05$) of the majority of students (Always=29%, Mostly=39%, and mean=3.85) about try their best to forgive others for their short coming. The analysis of statement No. 7 shows a significant response ($\chi^2=623.7$, $p<0.05$) of the majority of students (Always=32%, Mostly=34%, and mean=3.87) about resolve disagreements and deal with anger peacefully without violence.

Table 3 Knowledge/Understanding /Civic Management as Aspects of Citizenship among University Graduates

St.No	Statements	Response					Mean	χ^2
		A	M	S	R	N		
1	As a student I am acquainted with critical thinking, analyzing information, expressing opinions.	471 (31%)	557 (37%)	345 (23%)	116 (8%)	11 (1%)	3.90	715.6*
2	I like to take part in discussions and debates, negotiating, conflict resolution, and participating in community.	548 (37%)	528 (35%)	285 (19%)	123 (8%)	16 (1%)	3.98	752.3*
3	It is my utmost urge to respect for justice, democracy and the rule of law, openness and tolerance.	400 (27%)	587 (39%)	374 (25%)	107 (7%)	32 (2%)	3.81	689.7*
4	As a student I have courage to defend a point of view.	505 (33%)	553 (37%)	290 (19%)	128 (9%)	24 (2%)	3.92	706.3*
5	I also have willingness to listen, to work with and stand up for others	443 (30%)	593 (39%)	338 (23%)	108 (7%)	18 (1%)	3.89	747.1*
6	I strive to treat others the way they want to be treated.	486 (32%)	547 (37%)	303 (20%)	147 (10%)	17 (1%)	3.89	663.7*
7	As a community member I respect the dignity, privacy and freedom of all individuals.	475 (32%)	526 (35%)	345 (23%)	131 (9%)	23 (1%)	3.87	630.1*
8	I try my best to give value and honor to all people, no matter what they can do for me.	500 (33%)	544 (36%)	300 (20%)	140 (10%)	14 (1%)	3.96	112.3*

9	Being a community member I respect others' property; take good care of property as I am allowed to use and do not take or use property without permission.	472 (31%)	568 (38%)	298 (20%)	151 (10%)	11 (1%)	3.89	690.4*
10	As a community member I respect the autonomy of others.	441 (29%)	607 (40%)	302 (20%)	139 (10%)	11 (1%)	3.90	745.3*
11	I try my best to tell others what they should know to make good choices about their own lives.	492 (33%)	565 (38%)	317 (21%)	113 (7%)	13 (1%)	3.94	749.1*
12	I never think to use or manipulate others.	470 (31%)	568 (38%)	285 (19%)	152 (10%)	25 (2%)	3.87	661.6*
13	I consider it very bad to abuse, demean or mistreat anyone.	492 (33%)	560 (37%)	299 (20%)	124 (8%)	25 (2%)	3.91	703.6*

Expected Frequency=300 p=0.000, *Significant at 0.05

Table 3 shows the students' knowledge and understanding as an aspect of citizenship. The analysis of statement No.1 shows a significant response ($\chi^2=715.6$, $p<0.05$) of the majority of students (Always=31%, Mostly=37%, and mean=3.90) about acquainted with critical thinking, analyzing information and expressing opinions. The analysis of statement No.2 shows a significant response ($\chi^2=752.3$, $p<0.05$) of the majority of students (Always=37%, Mostly=35%, and mean=3.98) about like to take part in discussions and debates, negotiating, conflict resolution, and participating in community. The analysis of statement No. 3 shows a significant response ($\chi^2=689.7$, $p<0.05$) of the majority of students (Always=27%, Mostly=39%, and mean=3.81) about have utmost urge to respect for justice, democracy and the rule of law, openness and tolerance. The analysis of statement No. 4 shows a significant response ($\chi^2=706.3$, $p<0.05$) of the majority of students (Always=33%, Mostly=37%, and mean=3.92) about have courage to defend a point of view. The analysis of statement No. 5 shows a significant response ($\chi^2=747.1$, $p<0.05$) of the majority of students (Always=30%, Mostly=39%, and mean=3.89) about have willingness to listen, to work with and standup for others. The analysis of statement No. 6 shows a significant response ($\chi^2=663.7$, $p<0.05$) of the majority of students (Always=32%, Mostly=37%, and mean=3.89) about strive to treat others the way they want to be treated. The analysis of statement No.7 shows a significant response ($\chi^2=630.1$, $p<0.05$) of the majority of students (Always=32%, Mostly=35%, and mean=3.87) about respect the dignity, privacy and freedom of all individuals. The analysis of statement No. 8 shows a significant response ($\chi^2=112.3$, $p<0.05$) of the majority of students (Always=33%, Mostly=36%, and mean=3.96) about try their best to give value and honor to all people, no matter what they can do for them. The analysis of statement No.9 shows a significant response ($\chi^2=690.4$, $p<0.05$) of the majority of students (Always=31%, Mostly=38%, and mean=3.89) about respect others property; take good care of property as they are allowed to use and do not take or use property without permission. The analysis of statement No. 10 shows a significant response ($\chi^2=745.3$, $p<0.05$) of the majority of students (Always=29%, Mostly=40%, and mean=3.90) about respect the autonomy of others. The analysis of statement No. 11 shows a significant response ($\chi^2=749.1$, $p<0.05$) of the majority of students (Always=33%, Mostly=38%, and mean=3.94) about try their best to tell others what they should know to make good choices about their own lives. The analysis of statement No. 12 shows a significant response ($\chi^2=661.6$, $p<0.05$) of the majority of students (Always=31%, Mostly=38%, and mean=3.87) about never think to use or manipulate others. The analysis of statement No. 13 shows a significant response ($\chi^2=703.6$, $p<0.05$) of the majority of students (Always=33%, Mostly=37%, and mean=3.91) about consider it very bad to abuse, demean or mistreat anyone.

DISCUSSION

This study was conducted to explore the sense of good citizenship among university graduates: Pakistani perspective. Outcomes regarding the objective of the research i.e. to explore the characteristics of good citizenship among university graduates were discussed below:

Social/Professional responsibility as an aspect of citizenship among university graduates indicated that,

The university graduates' responses significantly favored their sense of professional responsibility. Their responses showed that they had significant strive to achieve the highest quality, effectiveness and dignity in both the process and products of professional work ($\chi^2=806.4$, $p<0.05$); they significantly liked to acquire and maintain professional competence ($\chi^2=706.5$, $p<0.05$), and significantly want to know and respect existing laws pertaining to professional work ($\chi^2=719.7$, $p<0.05$). Similarly at significant level they accept and try their best to provide appropriate professional review ($\chi^2=741.6$, $p<0.05$); had given importance to computer literacy and related skills ($\chi^2=681.5$, $p<0.05$); wished to honor contracts, agreements and assigned responsibilities ($\chi^2=645.7$, $p<0.05$), and tried to improve public understanding of information and communication technologies ($\chi^2=705.4$, $p<0.05$). These

findings were in line with the findings of research conducted by Kahne, Westheimer and Rogers (2000), Saltmarsh (1996).

Tolerance and Acceptance as aspects of citizenship among university graduates showed that,

The university graduates' responses significantly favored their tolerance. Their responses showed that they significantly trusted because others know who they are: what other see is what they get ($\chi^2=652.0$, $p<0.05$); they had significantly tried their best to judge others on their character, abilities and conduct without regard to race, religion, gender and livings ($\chi^2=635.1$, $p<0.05$), and were significantly tolerant, respectful and accepting of those who are different from them ($\chi^2=598.9$, $p<0.05$). In the same way, at significant level they listened to others and tried to understand their points of view ($\chi^2=821.1$, $p<0.05$); were compassionate, kind, loving and empathetic with other society members ($\chi^2=693.6$, $p<0.05$); tried their best to forgive others for their short coming ($\chi^2=670.0$, $p<0.05$), and resolved disagreements and deal with anger peacefully without violence ($\chi^2=623.7$, $p<0.05$). These findings were in line with the findings of research conducted by Kahne, Westheimer and Rogers (2000), Saltmarsh (1996).

Knowledge/ Understanding/Civic Management as aspects of citizenship among university graduates showed that,

The university graduates' responses significantly privileged their knowledge and understanding. Their responses showed that they were significantly acquainted with critical thinking, analyzing information and expressing opinions ($\chi^2=715.6$, $p<0.05$). They significantly like to take part in discussions and debates, negotiating, conflict resolution, and participating in community ($\chi^2=752.3$, $p<0.05$); had utmost urge to respect for justice, democracy and the rule of law, openness and tolerance ($\chi^2=689.7$, $p<0.05$). Similarly, the university students had significant courage to defend a point of view ($\chi^2=706.3$, $p<0.05$); had willingness to listen, to work with and standup for others ($\chi^2=747.1$, $p<0.05$), and strive to treat others the way they want to be treated ($\chi^2=663.7$, $p<0.05$). They respect the dignity, privacy and freedom of all individuals ($\chi^2=630.1$, $p<0.05$); tried their best to give value and honor to all people, no matter what they can do for them ($\chi^2=112.3$, $p<0.05$), and had significant respect for others property; take good care of property as they are allowed to use and do not take or use property without permission ($\chi^2=690.4$, $p<0.05$). At significant level, the university students respect the autonomy of others ($\chi^2=745.3$, $p<0.05$); they had tried their best to tell others what they should know to make good choices about their own lives ($\chi^2=749.1$, $p<0.05$); never think to use or manipulate others ($\chi^2=661.6$, $p<0.05$), and considered it very bad to abuse, demean or mistreat anyone ($\chi^2=703.6$, $p<0.05$). These findings were in line with the findings of research conducted by Boyer (1990) and Mullins (1990).

Conclusions and Recommendations

It has been extracted from the results, findings and discussion that university graduates possess the characteristics of good citizenship. University graduates have proper credit for intellectual property, respect the privacy of others and try to honor confidentiality. They acknowledge the importance of vote and strive to achieve the highest excellence, effectiveness and dignity in both the process and products of professional work. They like to acquire and maintain professional competence, desired to know and respect existing laws pertaining to professional work, acknowledged and try their best to provide appropriate professional review. Graduates give importance to computer literacy and associated skills and have endeavored to improve public understanding of information and communication technologies. They try their best to judge others on their temperament without regard to race, religion, gender and livings. They are broadminded, compassionate and devoted with other society members. They try their best to vindicate others for their shortcoming and deal with anger peacefully without aggression.

University graduates have firm faith in the welfare of the country and know that the important quality of a good student is patriotism; have genuine love for motherland and had a sense of involvement in its day to day affairs. They know that compliance to laws is the important public duty so they never try to resist a law and have believed in changing unjustified law by constitutional means, and liked to take part in discussions, conflict resolution, and participating in community. University graduates strive to treat others the way they want to be treated and tried their best to give honor to all people, no matter what they could do for them. They take good care of others property as they were allowed to use and did not take or use property without permission.

Hence considering the outcomes it is indispensable to propose certain suggestions for the advancement as well as the perfection of citizenship in the country. All the institutions of higher education may considered mandatory to pass on guidance in citizenship proficiencies and learning. These instructions may furnish the learner through the comprehension, skillfulness as well as stance for civic edification. The Curriculum Planners with Policy Makers and Higher Education Commission may initiate a mega project for generalizing citizenship throughout the country. For dispersion of consciousness concerning citizenship education, Institutes of Civic Learning, Civic

Education Departments or Civic Centers may establish throughout the country. The concerned authorities may set a plan for operating the skills of committed and contented civic intellectuals to enhance the citizenship by means of sermons, workshops and seminars within the universities.

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Identification of Spatial Pattern in *Pakungwati* as a Reflection of Architectural Transformation between Hindu-Buddhist and Islamic Palace in Jawa

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ABSTRACT

Studies relating to the architectural transformation of Javanese Palace ranging from the late Hindu-Buddhist era of the Majapahit Kingdom to the subsequent Islamic era have not yielded any substantial revelations so far. This phenomenon can be said to suffer from a missing link. *Dalem Agung Pakungwati* is estimated to be one of the first palaces to have been established in the era of Early Islamic development on Java after the fall of the Majapahit Kingdom and is currently part of the *Kasepuhan* Palace in Cirebon, West Java. This study is expected to be an eye-opener leading to new insights, which can be used to examine the spatial pattern of the transitional palatial architecture from the Hindu-Buddhist Era to the Islamic Era. This research has been conducted with both the historical and qualitative approach. Through this study, the *Dalem Agung Pakungwati* Palace can be identified as showing a spatial pattern that contained the transformative Hindu-Majapahit concept of Islamic values. The findings obtained are expected to be used to reconstruct the local values in the form of understanding the spatial pattern of architecture as the genuine essence or identity of the archipelagic architecture that is sensitive to the appreciation of ancestral heritage.

Keyword: Palace, Transformation, *Pakungwati*, Islamic, Hindu-Buddhist

INTRODUCTION

Javanese Palace are historical heritage buildings that illustrate the development of architecture in Indonesia along with the civilization behind it. The palace is considered to be the center of culture that has survived to this day, and it plays a very important role in urban life in Indonesia, both relating to the design of buildings and aspects of their environment. A palace can be considered as an embodiment of adaptive and dynamic architecture in response to the development of a particular era. Palace buildings (referred to as *Keraton*) have been around since the era of Hindu-Buddhism and continued during the period of Islamic expansion in Indonesia [1]. Studies related to the architectural transformation of palace on Java ranging from the late Hindu-Buddhist Majapahit Era to the Islamic Era are still lacking in terms of substantial revelations. This phenomenon can be said to entail a missing link in the context of its transformation.

The palace deemed to have developed in the era of transition, that is to say from the Hindu-Buddhist Era to the Islamic Era, is the *Dalem Agung Pakungwati* palace. It is located in the complex of the *Kasepuhan* Palace which was rejuvenated/renovated or modernized a few centuries later. The building pattern of the latter is outlined in a linear manner referring to the north-south axis as well as the more recent palace, known as the *Keraton Warisan Mataram Islam*, for example in Yogyakarta and Surakarta.

To connect the red thread between the architecture of the Hindu-Buddhist palaces and the architecture of the Islamic palaces, the *Dalem Agung Pakungwati* palace can serve as a bridge. Therefore, the study of this particular palace can be an important source of knowledge for the development of *Keraton* architecture in Indonesia, especially on Java. Based on artifacts in the field, the remains of the *Dalem Agung Pakungwati* are estimated to be recognizable so that it is possible to interpret the spatial architectural patterns through the reconstruction following the orientation of the arrangement. By employing the architectural typo-morphological approach [2] it is expected that spatial patterns and architectural forms can be identified.

2. RESEARCH METHODS

This research was conducted using the historical approach to understand the phenomena or aspects underlying the *Pakungwati* Palace's spatial design and its correlation with other manifestations of palace architecture found on Java, and with the Royal Puri Palace on Bali. Drawing a comparison with the latter is necessary for understanding

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spatial patterns in the Hindu context and in the context of Hindu-Buddhism. The Puri Palace on Bali can be considered as a continuation of the Majapahit tradition and style. The variables used in the analysis process are spatial planning in addition to mass and form. The analysis of this study has been conducted in a descriptive argumentative manner through the study of architectural morphology. To arrive at an interpretation, the spatial pattern and architectural orientation have been reconstructed. In general, the research steps taken consist of the following:

1. Reviewing and identifying matters related to the background of the *Pakungwati* Palace architecture in Cirebon, for example, covering historical, cosmological, cultural, ritual, geographical backgrounds through the study of relevant background literature, observations, and data collection regarding the object of study (method of observation and interviews); Reviewing matters related to phenomena that affect the architecture of the *Pakungwati* Palace.
2. Assessing the spatial pattern of *Pakungwati* Palace architecture in Java based on the morphology including its transformation.
3. Comparing spatial patterns and assessing *Pakungwati* Palace's analogous correlation with the architecture of the Majapahit Palace, the Puri Palace on Bali, and other Keraton palaces on Java from the Islamic era such as the ones found in Yogyakarta or Surakarta.

This knowledge can underlie the understanding of the reconstruction of the *Pakungwati* Palace's spatial pattern so that it can be used as a basis for understanding the development of the architecture of these early Islamic palaces on Java. Through this research the palatial heritage built in the early transitional Islamic era on Java is closely examined, which is estimated to have retained elements of Hindu-Buddhist architecture such as Majapahit. This research can open one's mind to the idea that the legacy of the Majapahit spatial pattern is actually estimated to be still recognizable in coastal areas on Java, besides the ones found on Bali.

3. RESULTS AND DISCUSSION

Spatial Patterns of the Majapahit Palace on Java and the *Puri* Palace on Bali

According to Hemanislamet [3] which considering the several interpretations of the arrangement of the city of Majapahit in Trowulan based on Kern, Maclaime Pont, Pigeaud, Stutterheim, Kern, Slametmulyana, show similarity in certain elements, namely: (1) the position of the city towards the direction of the wind; (2) identification of the palace as a city center as the core even though the core of the city is not always located at the center; (3) more details in the form of 3 palaces by having its own *winata* ward; (4) the location of Dharmajaksa Shiva and the Buddha at the back of the Palace; (5) at the front of the central core is a public zone containing a meeting hall (*manguntur*), *pendapa* (open verndah serving as an audience hall), *pahoman* / sacred buildings / temples, large fields (possibly town squares), and markets whose details are interpreted differently by researchers, whereas the palace of the princes and the houses of officials and noblemen are located around the core at the same distance.

Based on the results of Bakorsurtanal aerial photographs, it can be seen that there is a grid geometric pattern in the Trowulan area which is estimated to be the former center of Majapahit city. This grid pattern can be linked to the mandala concept along with the distribution of zones. especially for elite/official/clerical groups, while organic patterns are possible for villages outside the city on the hillsides and mountainsides. It is believed that Majapahit also made use of an axis pattern referring to the mountain concept- Mount Penanggungan. Another description of the form of settlements can be seen in enshrined reliefs. Relief illustrations show a grid pattern in the buildings and concentric patterns in rural and urban areas.

Studying the remnants of Majapahit civilization can be accomplished by searching the rural and urban arrangement on the island of Bali, considering the influence of Majapahit is still quite strong there, such as on Puri[4]. The pattern of urban and rural settings in Bali shows the use of square-grid and linear concentric elements. The sacred point is placed at the intersection (Perempatan Agung) which is formed from the cross line of paths, lanes, and roads. This intersection is an 'empty space' shaped node. Around this center there is the Puri palace (residence of the ruler), Pura (place of worship), and a gathering place in the form of Wantilan/Bale Banjar that is equipped with fields and a market place. The arrangement of the position of the elements around the intersection looks equally distributed; it does not look prominent, and it is doubtful whether any of them mattered. The castle uses the Sangamandala or Nawasanga pattern [5] which is arranged to form a grid pattern for the actual placement of the buildings. The description of the Balinese pattern is also recognized in the spatial pattern depicted in the reliefs of the heritage of Majapahit. Broadly speaking, the spatial structuring pattern in Bali shows the existence of linearity, namely the concept of the mount-sea,

and at the same time it is concentric in the form of a grand intersection, and the use of the grid, and the Sangamandala appears to have been used in the Puri buildings and its dwellings.

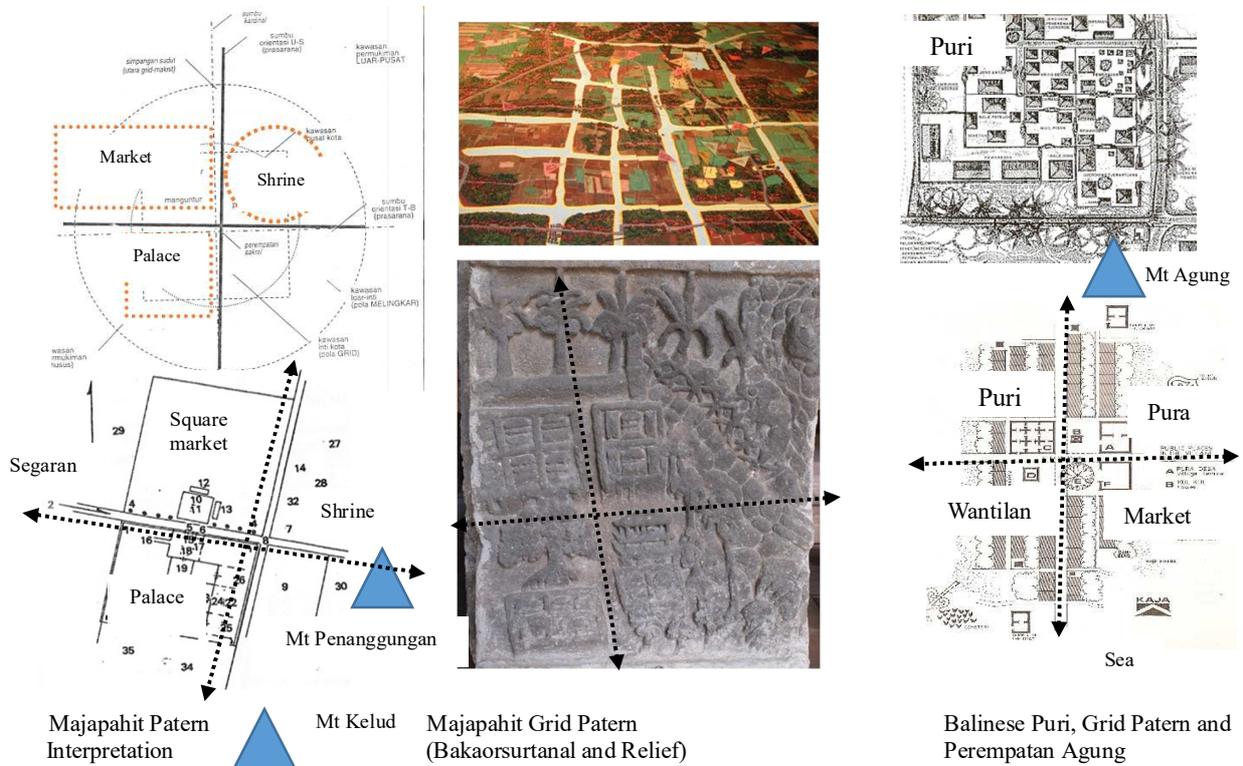


Figure 1. The Relation between Majapahit and Balinese Patern, Grid, Mount-Sea Orientation and intersection (Perempatan Agung)[6][7]

The Spatial Pattern of Javanese Palaces in the Islamic Era on Java

On the island of Java, towns that were characterized by Islamic features developed from the era of *Demak* followed by *Cirebon*, *Banten*, and others. These towns show a unique arrangement of spatial structures, namely the square, with the palace to the south, the mosque in the west with *santri* settlements for Islamic students/adherents located behind the mosque [8]. Cosmologically, the spatial structure refers to the concept of *Moncopat* (manca = 5 and pat = 4), that is to say one main center in the middle surrounded by four surrounding areas and emphasizing linear orientation on the north-south axis (the mountains). This shows the presence of spatial duality other than concentric with the four corners and linear.

Basically, the *Moncopat* concept not only regulates the problem of territorial constraints but is also related to the basic concepts of community life which refer to the balance between the macrocosm and microcosm. If it is drawn on the scale of the concept of cosmology, then the core palace /town as the center is surrounded by four sacred points around it as its protector, such as the Surakarta palace with its metaphysical supporters in the North (*Krendowahono* forest under the authority of *Kalayuwati* Goddess), South (Sea under authority of *Kanjeng Ratu Kidul* Goddess), East (Lawu Mount under authority of *Kanjeng Sunan Lawu*), and West (Mount *Merapi* under the authority of *Kanjeng Ratu Sekar Kedaton*) [7], while *Yogyakarta* places more emphasis on the Northern (Mount *Merapi*) orientation, and the Southern (South Sea). However, in general, the territorial structuring principle of the heritage city of *Mataram* is divided into 4 zones arranged hierarchically, the more central to the central position that is held sacred. Physically, other cities in the *Sultan Agung* era can be divided into *Kutagara*, *Nagaragung*, foreign countries/regions, and peripheral/coastal regions (*pasirsiran*).

According to Selo Sumardjan in Santoso[9] the territorial structure of the *Mataram* kingdom is generally in the form of a multi-level circle system with four different radius. The central circle is the manifestation of the ruling king. The physical representation of the sultan is the palace and its accessories (internal and religious administrators) The second circle is the state that covers the central area of the kingdom or the capital, the location of aristocrats and important people in profane life (traders, commanders-in-chief called *senopati*, and the like), and the economic-market center. The third circle is the Supreme State, covering all the main regions under the absolute authority of the king, which is headed by the Supreme Governor (*mahapatih*) and divided into sub-regions headed by the vice-governor (*patih*) and given responsibility for land management and tributes. The fourth circle consists of foreign regions, each headed by the Regent appointed by the sultan of the local nobility.

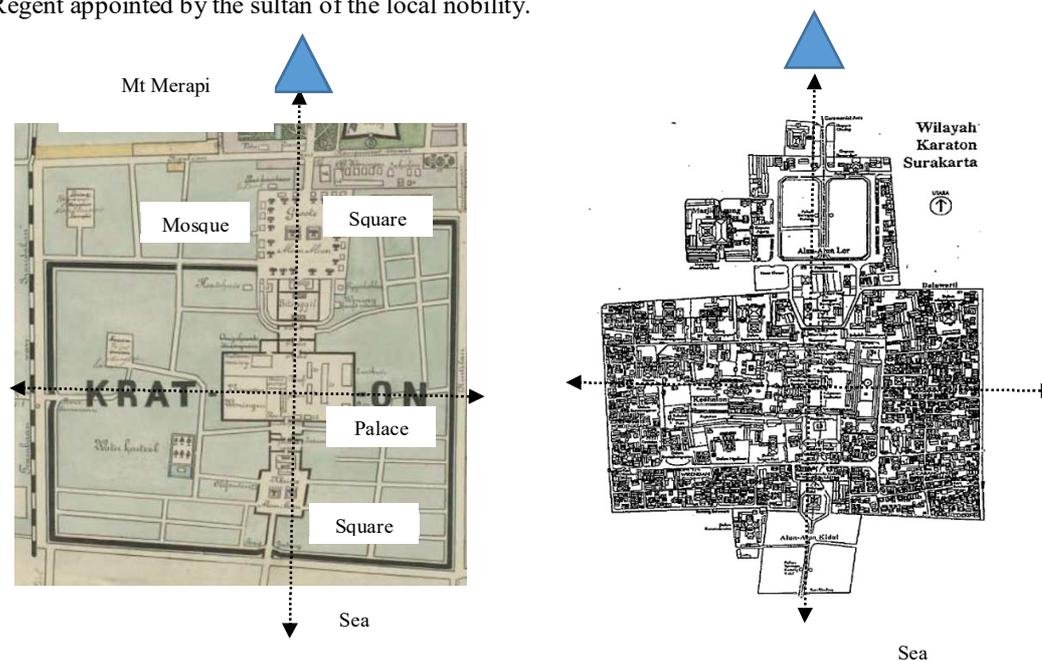


Figure 2. Yogyakarta and Surakarta Palace (*Kraton*) [10][11]

Spatial Pattern of the Pakungwati Palace

Based on the artifacts in the field, the *Pakungwati* building complex is a square grid pattern with brick walls [12]. This pattern is reminiscent of the pattern of residential buildings or chateaux on Bali or as depicted inside reliefs of the *Majapahit* era. When it was in the form of an initial residence, *Pakungwati* was expected to face East. Functionally, the East indeed displays the sea, so that the initial building is expected to face the sea as a characteristic feature of a coastal building.

Buildings that are estimated to be even older, namely the *Bale Witana Kraton Kanoman*, also face east or towards the sea. The direction of this orientation can be attributed to two thoughts, namely the concept of the sea mountain which is the ancient concept of the archipelago or the concept of the *Kiblat* (direction of Islamic prayer) considering that the occupants are Muslim families, led by Prince *Cakrabuana*. In the West, apart from the *Kiblat* associated with the imaginary orientation of the mountains, there is Mount Ciremai. On the East side of *Pakungwati*, the building that is considered important is the *Pejlagrahan* Mosque which was built earlier than the *Sang Ciptarasa* Great Mosque. *Pejlagrahan* refers to the terminology of floating on water, which indicates the location of this mosque was indeed close to the sea in the past.

In subsequent developments when it became the center of government, the next building was estimated to have been added. The *Pakungwati* building then developed into the palace, adding *sithinggil*, *alun-alun*, and mosque elements. This mosque became known as the Great Mosque of *Sang Ciptarasa*. With the existence of these buildings, it is estimated that the orientation of the Palace in general began to be used in the north-south direction, even though the orientation of the East- West was still recognized in in the main complex of *Pakungwati*. Thus the orientation that

refers to the four directions can be identified in this complex which is identical to the concept of the arrangement of the *Majapahit* Palace.

North-South refers to Mount *Sembung* (the tomb of *Sunan Gunung Jati*) in the north and in the south there is a river or *Rara Denok* (a place to store heirlooms) or *Bale Kambang* (all use elements of water like the ocean), and in the West Mount *Ciremai* is located, while in the East there is a sea. The use of buildings surrounded by a pool of water or the typical *Bale Kambang* is closely related to the Hindu-Buddhist tradition of describing *jambudwipa* surrounded by oceans. The earlier Islamic *Mataram* palaces also featured buildings surrounded by water, for example *Tamansari* in Yogyakarta. The cosmological pattern embodied through the pattern of space that pays attention to these four directions shows that the ideas developed in the linear (hierarchical) and Hindu-Buddhist traditions of the four-way grid *Mandala*. This indicates the concept of ambiguity, namely linear and concentric patterns leading to four directions.

Referring to Jo Santosa [13], in the Eastern worldview according to geomatics, cities are imitations of the macrocosms that must be built according to the structure of the laws of natural balance. The relationship between the spatial parts of space in these places is formed based on two hierarchical microcosmic principles and microcosmic duality. The above study shows that the *Pakungwati* complex can be associated with concentric and linear grid patterns (north-south) mountains developed in the Pre-Islamic era. The influence of *Majapahit* is reinforced by a grid pattern that is insulated.

Majapahit is also estimated to have used a four-way orientation but there is a main reference, namely the mountain-sea; if we take Mount *Penanggungan* as the former, then the latter can take the form of rivers or ponds in the middle. *Pakungwati* has a mosque in the western part of the square, while *Majapahit* has a temple. Thus it can be seen that there is a phenomenon of transformation from the center in the form of open space node (*Majapahit*-Bali) and in the form of a crossroad into a palace building (*Pakungwati*). If in the order of the *Perempatan Agung*, Palace, buildings of worship, the marketplace, and the gathering place are equal and balanced, then the concept of *Pakungwati* is transformed with the center in the form of a palace with its square and mosque (in *Demak* the center is a mosque and its square).

Within the *Pakungwati* complex, the concept of duality can be recognized by the existence of linear and grid-concentric elements such as the ones found in the *Majapahit* and Balinese styles [14]. Based on reflections from Bali, it is estimated that the composition of a *Majapahit* town will not be much different from the one found on Bali. Square-hybrid and linear concentric elements are also expected to have been used in cities and rural areas during the *Majapahit* period. During the Islamic *Mataram* period this tradition continued with the use of square-grid linear and concentric patterns, such as the *Moncopat* concept.

During the formation of the city of Yogyakarta and Surakarta this linear concept was strengthened by the existence of two squares in line. However, the intersection of *Prapatan Agung* which is known in the spatial arrangement of Hindu traditions was transformed into the *Kraton* palace and its squares in the era of Islamic *Mataram*. In the context of *Pakungwati* it is estimated that it still employed two concepts such as *Majapahit*, namely the alun-alun square and the grand intersection called *Perempatan Agung*.

Islamic values subsequently enriched the meaning in the spatial pattern in the *Pakungwati* complex by strengthening the *Kiblat* orientation of the residential complex in *Dalem Pakungwati* which places the entrance on the East side which is characterized by the existence of receiving buildings, and the placement of male and female zones separately. This is evident from the existence of *Keputran (man)* and *Keputren (women)* zoning. The latter (the place for women) is attached to the main building of *Dalem Pakungwati* which is marked by the existence of a water park, while the former (male zone) is separated by a corridor and is located in front of the close to *Sitihinggil*. Based on the North South orientation in *Pakungwati*, the female zone called *Keputren* is located on the south side adjacent to the *Rara Denok* Building as a place to store heirlooms and the male zone called *Keputran* is situated in the North. These models of *Keputran* and *Keputren* were followed and developed by later Islamic-style palaces such as the Surakarta Palace and Yogyakarta. [15].

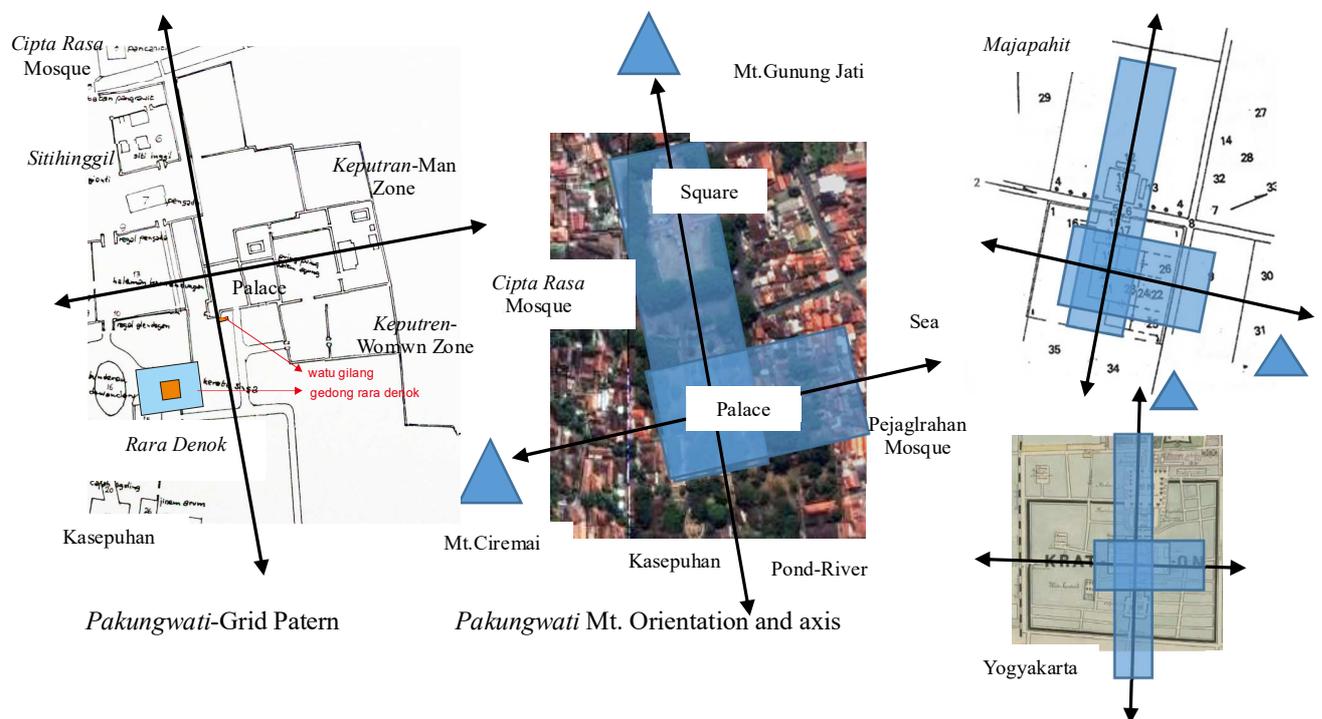


Figure 3. Comparison Pakungwati between Majapahit and Yogyakarta Palace (Kraton) [15]

The north-south pattern was still used by the Palace which was built earlier than the *Dalem Agung Pakungwati* namely *Kasepuhan* in this complex, and *Dalem Agung Pakungwati* was later abandoned. The *Kasepuhan* Palace still uses *sithinggil*, *alun-alun*, and the existing Sang Ciptarasa Great Mosque. The building inside the *Kasepuhan* Palace is linearly arranged to the north and south. In the south there are also a Balekambang and Mount Indrakila, such as *Dalem Agung Pakungwati*. In the south this is indicated by the existence of small Indrakila hills and Balekambang (water) which are basically sourced from ancient traditions depicting *Jambudwipa* and *Samudra* (the Ocean). In this complex, there are finally two important points, namely *Dalem Pakungwati* in the form of a grid oriented to the East-West and the core building of the *Kasepuhan* Palace itself, which is oriented to the North-South direction.

The figure of the building in the *Dalem Pakungwati* complex is estimated to be identical to Majapahit architecture, namely using a hip-roof, with various patterns of poles and walls, and surrounded by walls. The rest of the building that remains is only the shape of the gate that is identical to the *Majapahit* split gate. The building that is still considered intact and recognizable is a *Sithinggil* building with a group arrangement forming a grid pattern with gable roofs and floors that resemble the *Majapahit* building typology depicted in enshrined reliefs, which look like chateaux or dwellings on the island of Bali. The *Sithinggil* building is surrounded by walls and has a split gate conform to *Majapahit's* heritage. The wall decoration is reminiscent of the geometric cruciform medallion ornamentation patterns as encountered on the walls of the Majapahit temples. If the year of construction for *Sithinggil* is not far removed from *Pakungwati*, the building inside *Pakungwati* can also be analogous to using the same patterns as *Majapahit*[15]



Figure 4. Comparison Majapahit architecture and Main Pakungwati (gate, wall, grid patern) [15]

5. Conclusions

Pakungwati shows a pattern that combines transformative Hindu-Majapahit concepts with Islamic values. This can be seen from the use of grid patterns in the Majapahit and Balinese style and tradition. In addition, linear and concentric concepts are also identified - leading to four directions, so that hierarchical concepts and duality can be recognized. This can be gleaned from the typo-morphology of the space and mass order both in *Pakungwati* itself and the relation with other buildings, namely *Sitihinggil*, *Alun-alun* (squares), and the Great Mosque. In Dalem *Pakungwati*, it is estimated that the division of zones based on gender is known, namely areas reserved for males and females, thus reflecting Islamic values. The concept of Islamic *Mataram* cities that is currently discernible at the Yogyakarta and Surakarta Palace is estimated to be a further development of the existing patterns in *Cirebon Kasepuhan*, especially the ones observed at the *Dalem Pakungwati* palace. This phenomenon shows that there has been a transformation of the mass and space of the city center, from the Hindu-Buddhist period to the Islamic Era, even though the archetype is the same but the physical composition of the layout has been subject to change. The use of duality and its forms of transformation show that the dynamism of the creativity of the Indonesian society in responding to the changing times. This shows a strong awareness of the necessity to attain harmony with nature and show respect for one's ancestral heritage. This awareness should in the modern period be fostered continuously in urban design, including its buildings.

Acknowledgements

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Physical-Chemical Remediation of Oil-Polluted Sea Waters

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ABSTRACT

Oil spills have given extraordinary treatment and caused short and long term damage to the sea ecosystem. Characteristics of oil and polluted site conditions are limiting factors for the physiochemical fate of oil compounds in ecosystems. Furthermore fate determines risk based approach in controlling pollution. Therefore, physical-chemical improvements are site-specific technologies for remediating oil contaminated oil marine ecosystem. A preliminary study must be carried out to choose the suitable one technology and monitoring methods must be provided for the technology chosen.

KEYWORDS: oil spills, fate, marine ecosystem, remediation, monitoring

1. INTRODUCTION

The energy needs of human life activities continue to use hydrocarbon (fossil) energy sources. Various exploration, exploitation, transportation, storage, processing and distribution activities of crude oil and refined oil often produce leakage and / or oil spills into the environment. Particularly in the chain of exploitation - distribution through sea media, oil spills in the sea have impacted multidimensional pollution for marine life itself, fisheries, tourism businesses, to the extent of sea damage [1]. Oil is still widely used, although security measures are developed, leakage and / or oil spills in the sea are almost certain to continue. Therefore, pro-active action to prepare for the recovery of marine pollution is necessary for the purpose of: responding to pollution, or reusing it as a place for oil exploitation activities.

Crude oil and refined oil are complex hydrocarbon compounds which have thousands of variations of compounds. The diversity of oil compounds produces a variety of physical chemical qualities [2]. Knowledge of oil characteristics, and ocean characteristics, is a prerequisite for predicting the behavior of oil spills at sea and treatment for pollution recovery.

The diversity of oil characteristics and experiences of oil pollution events at sea shows that the methodology for pollution recovery is site-specific [3]. This is a challenge in the efforts to restore oil pollution at sea required local pre-study to establish appropriate recovery technology. Recovery technology can be carried out both physically chemically, and in combination. The difference in the application of recovery technology requires an appropriate method of monitoring and evaluation. The match between the pre-study, the application of technology, and monitoring and evaluation will result in an effective and efficient performance in the recovery of oil pollution at sea.

2. Oil characteristics

The physical properties of oil which affect the behavior of oil in the sea and its recovery. Important physical properties are density, viscosity, pour point, and water solubility. Density is expressed as specific gravity and American Petroleum Institute (API) gravity. Specific gravity [3] is the ratio of the weight of the oil mass and the mass weight of water at a certain temperature. API gravity is expressed in numbers 10° in pure water 10° C. API gravity can be calculated from specific gravity using the formula: $AP\ Gravity(o) = (141.5 / Specific\ Gravity\ 10oC) - 131.5$. Crude oil has a specific gravity in the range 0.79-1.00 (equivalent to API 10 - 48). Oil density is important for predicting oil behavior in water.

Viscosity is a trait that shows resistance in shape and movement changes. Low viscosity means it is easy to flow. Viscosity factors are oil composition and temperature. This viscosity is important for predicting the spread of oil in water.

The point of change is the temperature level that changes the oil to solidify or stop flowing. The point of change of crude oil varies between -57° C to 32° C. This point of change is important for predicting oil behavior in water and establishing environmental cleaning strategies.

The solubility of oil in water is low around 30 mg / L [4] and depends on the chemical composition and temperature. The amount of solubility is achieved by aromatic oils with small molecular weights such as benzene, toluene, ethylbenzene, and xylene (BTEX). This solubility is important for predicting oil behavior in water, bioremediation processes, and oil ecotoxicity.

The chemical characteristics of oil are different between crude oil and refined oil. Crude oil contains about 50-98% hydrocarbon compounds and the rest are non-hydrocarbon compounds (sulfur, nitrogen, oxygen, and some heavy metals). Classification of oil based on solubility in organic solvents, namely:

- 1) Saturated hydrocarbons. Included in this class are alkanes with the structure of C_nH_{2n+2} (aliphatics) and C_nH_{2n} (alicyclics), where $n > 40$. This saturated hydrocarbon is the highest content in crude oil.
- 2) Aromatic hydrocarbons. Included in this class are monocyclic aromatics (BTEX) and polycyclic aromatic hydrocarbons (PAHs: naphthalene, anthracene, and phenanthrene). PAHs are carcinogens, or can be transformed by microbes into carcinogenic compounds, so they become important compounds in maintaining environmental quality.
- 3) Resin. Included here are polar compounds containing nitrogen, sulfur, oxygen (pyridines and thiophenes), so they are also referred to as NSO compounds.
- 4) Asphalt. Included here are compounds with large molecular weight and heavy metals nickel, vanadium, and iron. Of course variations in the composition of crude oil are different in various places, which is why remediation technology is site-specific.

Refined oils such as gasoline, kerosene, jet oil, and lubricant are processed crude oil products through catalytic cracking and fractional distillation processes. As a processed product, refined oil has different physical chemical properties from crude oil. Refined oil contains crude oil and unsaturated hydrocarbon compounds such as olefins (alkenes and cycloalkenes) from the catalytic cracking process. Olefins content is quite large to 30% in gasoline and about 1% in jet fuel [4].

3. Oil behavior in the sea

When oil is exposed to the marine environment, oil will immediately change its physical chemical and biological properties. This change in nature will change / determine the remediation strategy. The process of changing physical properties includes:

- 1) Expansion. This expansion is perhaps the most important process during the initial exposure to oil in water, as long as the oil change point is lower than the ambient temperature. This process will expand the distribution of oil thereby increasing mass transfer through the process of evaporation, dissolution and biodegradation.
- 2) Evaporation. This process can be relied upon to remove oil fractions with toxic content and low molecular weight. Alkane ($<C_{15}$) and aromatic evaporation takes place between 1 - 10 days. Environmental factors that influence evaporation are wind, water waves and temperature. Evaporation causes oil to be left in the water to increase in density and viscosity.
- 3) Dissolution. This process is not significant in terms of mass transfer but is important in the biodegradation process. Aromatic with a small molecular weight and is the most toxic is the most water-soluble compared to other oil compounds. The speed of dissolution is influenced by the photo-oxidation process and biological processes.
- 4) Photo-oxidation. In aerobic conditions and exposed to sunlight, aromatic oils can be transformed into simpler compounds. These simpler compounds (hydroperoxides, aldehydes, ketones, phenols, and carboxylic acids) are more water-soluble thus increasing the rate of biodegradation but more toxic [5].
- 5) Dispersion. This spread occurs because of the concentration gradient process by forming an oil-water emulsion formation (oil droplets in the water column) thereby expanding the surface of the oil grain. Oil-water emulsions can be maintained by agitation (wind and waves are examples of natural agitation), or by the addition of dispersants.
- 6) Emulsification. Emulsification is the process of changing the status of oil droplets in water into water droplets in oil (also called chocolate mousse). Asphaltic ingredients can increase emulsification. But emulsification will make cleaning oil difficult.
- 7) Others. Included here is the process of oil adsorption on water solids, sedimentation and tar grain formation.

4. Physical-chemical remediation

Physical chemical remediation is effective for short-term / immediate goals of localizing and taking as much oil as possible from the sea. Physical remediation that has been practiced in general [6] are:

- 1) Boom and skimming. Booms are used to localize and control the movement of oil. Skimmer is used to take oil.
- 2) Wiping with absorbent. Hydrophobic material is used to wipe oil from the surface of the water.
- 3) Mechanical. Mechanical equipment is used to collect and dispose of oil-contaminated sediment. This is mainly done in coastal areas.
- 4) Washing. Washing uses low pressure cold water to high pressure hot water.
- 5) Relocation of sediment and tilling. Transfer of oil-contaminated sediment to another place or mixing with other sediment. This method is analogous to polluting dilution.
- 6) Local burning. Combustion of oil-contaminated sites is usually carried out together with flammable substrates (dry plants, dry waste). This is especially true for coastal areas.

Chemical remediation that has been practiced in general are:

- 1) Dispersants. The surfactant content is used to disperse oil into granules in water. The oil droplets have a total surface area of the granules thus accelerating the process. This method is used routinely in many countries, especially when facing physical remediation constraints.
 - 2) Demulsifiers. This material is used to break oil-water emulsions to speed up natural disperse.
 - 3) Solidifiers. This material is used to improve oil polymerization so that the oil becomes stable, minimizes spread, and increases the effectiveness of physical remediation.
 - 4) Surface film chemicals. Film-forming agents are used to prevent oil from being attracted to the open sea substrate, and to increase the removal of oil bound to the surface of pressure washers.
- Physical chemical remediation is short term [7] and incomplete remediation (mass transfer between environmental media). About 10-15% of pollutants can be removed from marine media.

5. Pre-study and monitoring

Pre-study and monitoring of remediation of oil-polluted seas is a must because it is site-specific and for the determination of appropriate and effective techniques for remediation activities. The minimum pre-studies and monitoring required include the following [8].

Predictive hazard assessments. This study is the first step in establishing remediation technology. This study aims to determine predictive behavior of oil in seawater both regarding the distribution of oil concentrations in water, air, solids / sediment and biota media. This study model can be used multi media fugacity models or release from the technosphere, and there are still many models that can be developed.

Treatability study. This study is a continuation of predictive hazard assessments. After knowing the distribution of oil concentration in environmental media, the amount of oil concentration in each media was tested by physical, chemical, microbiological, and plant remediation techniques.

The monitoring function is based on the intended use of monitoring, namely:

- 1) Retrospective monitoring. Retrospective monitoring is monitoring which results are used to make corrections or justifications for the predictive hazard assessments and application of technology. Both are monitored physically and / or using physical, chemical and biological indicators.
- 2) Prospective monitoring. Perspective monitoring is monitoring which results are used to make predictions. Ecotoxicity testing is an example of prospective monitoring. One indicator of the level of organic toxicity is the BOD / COD ratio. The results of monitoring of the BOD / COD ratio are increasing indicating the level of toxicity decreases.

CONCLUSION

The characteristics of crude oil are different according to the source, refined oil different characteristics according to processing, and if spilled on the ecosystem then the physical behavior of oil chemistry is site-specific. The specificity of the place determine the approach to pollution risk control and technology choices remediation. Physical chemical remediation is first aid to remove oil from environmental media.

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