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A Comparative Analysis of People New Environmental Paradigm Related to Water Resource Conservation Behavior Based on Gender: A Case in Manggarai, East Indonesia

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Abstract:
In national development, it is not simply focusing on modernization aspects, but empowering a local wisdom is a must. Environmental issues will determine development orientation based on sustainable development concept. How people perceive their environment (environmental paradigm) while they are conserving water resources is an example that people live harmoniously with nature. To what extend that two things (people paradigm and water resource conservation traditionally) are related to each other based on gender equality is the research question of this study. A survey method used by involving 120 people who live around water resource which conserved traditionally, in Manggarai district of Nusa Tenggara Timur, east Indonesia. Two instruments implemented in this study, New Environmental Paradigm (NEP) with items based of 5 dimensions developed by Dunlap, et.al. (1978 & 2000) and conservation behavior of water resource with 17 items. Research results reveal that 33 items were valid of NEP instrument with reliability .671 and only 11 items were valid with reliability .216. There were no significant difference of those reliability between male and female. There are 9 factors of NEP instrument should be omitted after varimax rotation based on its eigen values which produced 3 components (total sample). However, there is no eigen values difference between male and female which each produced 5 components. Moreover, it is found also that the correlation between people NEP and conservation behavior is .100 ($p < .27$) and again there is no significant correlation difference found between male and female. Therefore, it could be concluded that people NEP instrument could be validated empirically which affected by gender equality due to there was no difference between male and female, nevertheless, people NEP was not good predictor on conservation behavior of water resource, theoretical and practical implications would be discussed on this paper.

Keywords: *New Environmental Paradigm, Water Conservation, Varimax rotation, Factor Analysis*

1. Introduction

Human development is a focus of any development carried out in through out of country. It has been measured annually and its rank is published as well which indicated by three indicators such as life expectancy, enrollment rate, and GDP. In this case, life expectancy is mostly affected by human healthy which determined by the availability of healthy water resources. That is why human being should be encouraged to be more care toward the water conservation due to the limitation of resource in this planet.

Water is vital for human health because 70% of human body consist of water. The shortage of water resource is brought about by its low in percentage of water, only 2.5%, could be able to be consumed by human being. According to Indonesia Water Institute (2014) reported that since year of 2000 water resource is scare.

In Manggarai, South-East of Indonesia, where this study took place, it has been identified, there are 22 water resources are drying in 2010 (baratanews.com, 2012). Maloney & Ward (2003, p.22) stated that this condition called "the consequences of maladaptive human behavior. Manggarai is a tropical district and most of people utilize brown-belt water as a water resource which surrounded by mountain. Most of the people are peasants and influenced by traditional culture which regulate people in using and conserving water resource. People behavior in conserving and using water resource is determined by social culture where they live.

It might be caused by the way people view the ecosystem, including water ecosystem inside. Education, especially environmental education, has vital role in changing human thought, attitudes and behavior (Blaikie, 1993). Knowledge about ecology, human locus of control, and individual personal responsibility, etc. among other factors which determine people behavior. Human behavior should be directed to the way of their thinking which most of scientists called paradigm. In this case, paradigm related to the purpose in saving our the only one planet, that is what is called New Environmental paradigm (NEP). Therefore, in this study, there are three inter related research problems needed to be solved (1) how is the validity and reliability of NEP measuring people?; (2) is there any relationship between people NEP with people water conservation behavior?; (3) how is people NEP construct validity after validated by factor analysis? (4) is there any difference of people NEP between male and female?

2. Theory and Hypotheses

Related to the environmental paradigm, there are many scholars have a different perception on what human traits should be improved. It could be human cognitive, affective or psychomotor, however another scholar interested in improving human paradigm (Tobin & Aquillars in Campese, 2009, p. 54). If we want to change effectively we should work with paradigm, not merely talking about attitude, skill, or behavior. A quantum improvement would be happened when we work with paradigm (Covey, 2008).

Thomas Kuhn defined paradigm as a set of knowledge, belief, value, and technique which acquired by a person, a group of people in a society, therefore, a paradigm perceived as a general concept or way of view toward a given discipline. On other occasion, paradigm defined as "interrelated set of facts, concepts, generalizations, and theories that attempt to explain human behavior or social phenomena and that imply policy and action. Paradigmatic beliefs are basic in the sense that their acceptance is based far more on faith than on logic, and there is no way to establish their ultimate truthfulness" (Anon., 2014).

It has been characterized by an individual view toward the environment by taking a positive position toward nature and try to avoid understanding that human being is part of the environment (Putnam, 2006). Environmental world view, that is used to be used for giving a name for pro-environment group, has been mostly influenced by the progress of technology. In this case, it is required a new way of how people perceive the environment, it is called New Environmental Paradigm (NEP).

New Environmental Paradigm (NEP) is a new paradigm which its born to protect the environment by against the previous paradigm called Dominant Social Paradigm/DSP (Bechtel & Churhman, 2002, p.38). This DSP was characterized by anti-ecology compared to NEP which human oriented, green thinking and human are only one of many species inhabiting the earth or called eco-centric (Hanigan, 2006, p. 13).

NEP scale is a measure of people Environmental world view or paradigm (frame of thought, Anderson, 2012, pp. 260-262) which support "people pro—ecological world view. Extensively, it has been embedded in environmental education which it is believed there is still differences of people attitudes and behavior could be explained by environmental paradigm (Vallancourt in Redclift & Wodgate, 2010, p. 49). World view toward population called Dominant Social Paradigm (DSP) which was assumed, it has changed due to people' concern toward environment. It is presumably caused by NEP view which characterized by people concern control that lead to harmony values of living in this world (Nordlund & Garvil, 2002, pp.74-75).

Comparing to NEP view, DSP perceived differently with NEP. DSP viewed that environment could be changed and irrational utilization of natural resources (Schwartz, 1999). NEP was born inspired by Rachel Carson's Silent Spring (Anderson, 2012), since 1960s-1970s. Therefore, Riley Dunlap, et.al. (1978) developed an instrument measured NEP due to changes in transition, moving from DSP to NEP which is more "environmentally conscious world view."

NEP's original 12 items were successfully reduced to 6 items by Steger, et.al. (1989, in Geno, 2000, p.2). Dunlap, et.al., (2000, p. 434) stated that "15 items can legitimately be treated as measuring a single construct." Those 15 items developed by Dunlap, et.al. (2000, p.435) were based on 5 dimensions namely, limits to growth, anti-anthropocentrism, balance to nature, anti-exempt, and eco crisis.

This instrument had a reliability coefficient was .83(15 items) with range of item validity .33 - .62 (Dunlap, et.al., 2000, p.435). Moreover, in other research of NEP development found of its reliability respectively, with only 6 items was .6261 (2000), .621 (2004), and .422 (2008) reported by "Waikato Report' (2013, p.30). However, it was found also that its reliability was still low with only 6 items compared to what has been standardized around .70 (Hair, et.al., 2011, p.117).

When talking about people water conservation behavior, Alvard (1995a:790) stated that "…conservation can be defined as subsistence decisions that are costly to the actor in the short-term but aimed at increasing the sustainability of the harvest in the long-term" Conservation may be defined as a balance of policies, programs, plans, projects, and practices that run the gamut from exploitation to preservation in order to manipulate (manage) the rate of using natural resources in the interests of humankind. Conservation as managing resources in such a way that maximum human needs would be satisfied (Black & Fisher, 2001, p. 403).

Water conservation can be considered as prevention against loss of waste. Technically, this can be achieved by putting the water resources of the country for the best beneficial use with all the technology available in hand (Patel & Shah, 2008, p. 77). Related to traditional context, it has been known for long period of time where most of people utilized a traditional way, in term of ecological wise way, to conserve water resources. Conversely, at the era of digitalization which dominated by modern technologies, including people scientific way of thinking, people, mostly use their feeling and even their cultural values to utilize water wisely.

People aware of the limitation of water resources shortages lead them to be more positive in their water conservation behavior based on their knowledges, attitudes, and their ability. How do people behavior use water resources effectively and wisely due to its limitation of shortages, especially in nature, is among other indicators of people behavior in conserving water resources (Jeffries, 1997, p. 134).

Related to gender equality, most of scientist stated that gender and environmental issues are interrelated topics, for some reasons because of data which showed that mostly of women are still live at beyond poverty line. It is assumed that around 70 % of poor people in the world are women. Their access in utilizing natural resources are also different compare to men which characterized by their role in society. Its impact on natural conservation where men are more dominant than women in preserving, utilizing, and even destructing our nature. It is still studied, whether it is due to their right is different as well (Anon., 2014).

Moreover, in reality, there is different also in utilizing natural resources between men and women due to its different roles and division of labor between them. Women has a limited and less access toward natural system compared to men. Therefore, women is easier to get involve in destructing the ecosystem. Women and men are also have a different roles in managing water resources in term of how to utilize water, for example, women are the main user of water concern with house, sanitation and healthy.

That is why gender is one of the important factors that presumed affect people behavior in conserving water resources. In implementing concept of gender equality will be understood as a differentiation between women and men roles, responsibility, personal interest and their paradigm as well. Therefore, in trying to equalize based on gender equality, it is expected that women and men have the same paradigm toward world view, in this case "ecological world view in order to be more positive of people behavior in conserving water and other natural resources (Sasvari, 2010, p.19).

Gender equality is a concept about women and men which have the equal right, opportunity, and appreciation in utilizing natural resources. In the current context, Gender equality refer to the balance of chances between women and men in daily life especially related to decision making. In environmental context, gender equality becoming important problem to be examined due to; (1) Women perform two thirds of the world's working hours, produce half of the world's food, earn only 10% of the world's income and own less than 1% of the world's property. (2). Women are more reliant on natural resources for their livelihoods than men as they do not have equitable access to alternatives such as wage labor and the security and benefits these provide. (3) Degraded environments mean that women have to walk further to collect water and fuel wood. As a result their access to education and other productive activities may be curtailed and they will be exposed to the risk of gender based violence in isolated areas. (4) Women have less control of and access to land and natural resources than men. In many cases women are excluded from formal ownership of land. (5) Due to their socially constructed roles and existing inequalities, women are more vulnerable to the impacts of environmental and natural disasters such as drought, floods and cyclones than men. (6) Women are disproportionately vulnerable to sexual exploitation and abuse and other forms of violence in times of vulnerability and need. This risk increases at times of disaster.

Gender equality is a condition where women and men have equal freedom in developing their own ability without any barrier what should be done by women or men based on regulation toward their task. In this case, it does not mean that women and men is the same, but they should have equal treatment in term of their right, responsibility, equal opportunity regardless differences as women or men (Tobin & Aquillars in Campese, 2009, p. 254).

Research result found by Zelesny, et al. (2000) stated that gender affected individual behavior in term of caring toward the environment, in their research revealed that women have more attention on the environment compared to men. Another findings studied by Nordlund & Garvill (2002) which stated that individual values such as anthropocentrism and eco-centrism affected individual environmental concern. It was found also, based on this research, that individual who has an eco-centrism view is more concern with the environment than he or she who his or her view is anthropocentrism, especially deal with individual behavior in protecting the environment.

3. Methodology

This study applied survey method by involving 120 people of Manggarai distric area, in East Timor (NTT), Indonesia. A multistage random sampling has been implemented and there were two instruments measuring people New Environmental Paradigm (NEP/ 33 items) and water conservation behavior (11 items) have been developed.

People NEP instrument was developed based on Dunlap, et.al (1978 & 2000) five dimensions such as, limit to growth, anti-anthropocentrism, the fragility of nature balance, exemptialism, and anti-biocrisis (complete dimensions could be seen at table 1 below).

Dimensions	Indicators/Factors	Items Number
1. *Limits to Growth*	X1.1. Population growth	1,2,5,34,40
	X1.2. Nature conservation	3,10,13,59
	X1.3. Short/limiting resources	4,50,53,57
2. Anti-anthro pocentrism	X2.1. Right for living	12,33
	X2.2. Modifying nature based on human needs	6,8,15,43,44,47,51
	X2.3. Arrange the nature rationally	7,9,11,14
3.*The Fragility of Natures Balance*	X3.1. Environmentally sound technology utilization	19,23,24,46
	X3.2. Economic and ecological balances	16,37,58,60
	X3.3. Sensitive balance of nature	17,18,45,49, 61
4. *Rejection of Exemptionalism*	X4.1. Natural laws and principles restriction	27,28,41,56
	X4.2. Rational nature utilization	22,31,38
	X4.3. Natural ability to survive	21,36,62,39
5.*The Possibility of an Eco crisis*	X5.1. Irrationally activities toward nature	20,25,29,52, 54
	X5.2. Natural balances destruction	26,30,48,55
	X5.3. Concern with sustainable development	32,35,42

Table 1: Specification for Measuring Students' NEP

Each of dimensions has three factors which each factor consists of several items and total items is 60 (33 items valid with reliability was .91. Instrument for measuring people conservation behavior was also developed around 17 items (11 items valid with reliability was .77) based on 4 indicators. Those instruments were validated by computing its items validity and reliability coefficient was calculated by applying alpha Cronbach formula. Data, then, was analyzed by descriptive statistics, correlation coefficient, and confirmatory factor analysis (CFA).

4. Results and Discussions

Based on calculation it was found that the average of people water conservation behavior was high enough, around 39.55 comparing to theoretical mean, 55.00 with standard deviation 4.56. It was high in variation due to people personal, educational, and even economic background is high in variety. However, if it was compared to its average of people behavior between male and female, there was no significant difference (mean for male 39.32 and female was 39.77. Was it because of water problems that they were facing was the same, such as scare in availability are still questionable. One reason that could be used to argue is they live at the same environment which is uniform in social cultural values and is assumed to regulate their behavior on daily life, but it is still debatable.

Related to its reliability, instrument that measured people behavior found was too low, it was .216, but there was significant different of reliability coefficient between male and female. Female reliability coefficient was .095 comparing to male, .314 which higher than reliability for total male and female.

On the other calculation, it was found also correlation between people NEP with people water conservation behavior was .100 which was significant at .277. Unfortunately, both for male and female, correlation between two variables was not significant and even tend to be negative (see table 2). It could be said that, in this case, people NEP was not good predictor for people behavior in conserving water resource. Since NEP has been defined as a way of people thinking, then, if it is related to theoretical model developed by Hines, et.al. (1986/1987, quoted by Blaikie, 1993) and supported also by Hungerford & Volk model (1990), it is clear that people NEP could be directly affect the intention to act first before related to people behavior.

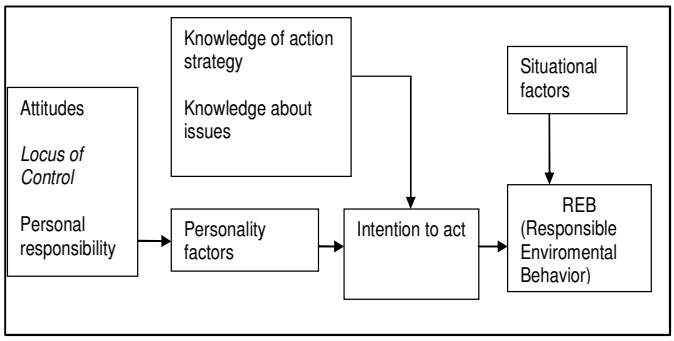

Figure 1: Hines' Model, et.al. (1986 in Blaikie, 1993)

		Behavior	NEPL	NEPP
Behavior	Pearson Correlation	1	-,039	-,018
	Sig. (2-tailed)		,763	,890
	N	120	61	59
NEP (Male)	Pearson Correlation	-,039	1	,041
	Sig. (2-tailed)	,763		,756
	N	61	61	59
NEP (Female)	Pearson Correlation	-,018	,041	1
	Sig. (2-tailed)	,890	,756	
	N	59	59	59

Table 2: Correlations NEP and Behavior, Male and Female

Component	Initial Eigen values			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3,196	21,305	21,305	3,196	21,305	21,305	2,047	13,644	13,644
2	1,679	11,196	32,501	1,679	11,196	32,501	2,023	13,484	27,129
3	1,386	9,241	41,742	1,386	9,241	41,742	1,681	11,204	38,333
4	1,314	8,757	50,499	1,314	8,757	50,499	1,645	10,965	49,298
5	1,169	7,793	58,292	1,169	7,793	58,292	1,349	8,995	58,292
6	,983	6,552	64,845						
7	,919	6,125	70,970						
8	,760	5,068	76,038						
9	,695	4,633	80,671						
10	,678	4,517	85,188						
11	,590	3,936	89,124						
12	,474	3,160	92,285						
13	,442	2,948	95,233						
14	,430	2,864	98,097						
15	,285	1,903	100,000						
Extraction Method: Principal Component Analysis.									

Table 3: Total Variance Explained

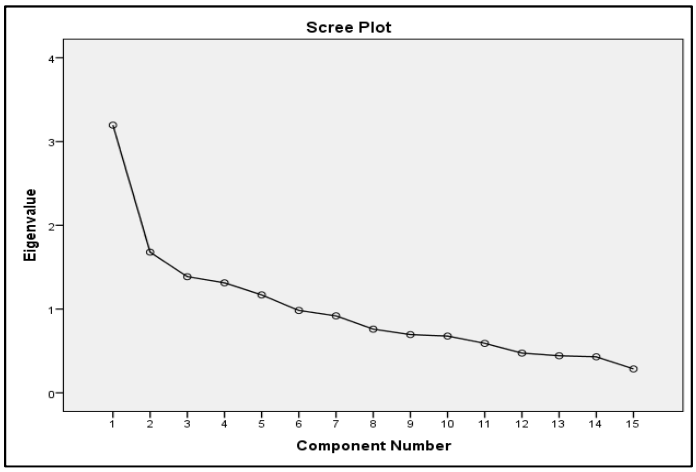

Figure 2: Components with higher than 1.00 of eigen values

	Component				
	1	2	3	4	5
F11	,222	-,089	,299	**,522**	-,436
F12	-,056	,011	,053	**,769**	-,014
F13	**,253**	**,456**	**,314**	**-,202**	**-,453**
F21	-,005	,028	,220	,008	**,731**
F22	**,490**	,120	,029	,108	-,007
F23	**,336**	**,556**	**-,066**	**,356**	**,117**
F31	-,189	**,789**	-,045	,000	-,169
F32	**,549**	**,436**	**,172**	**-,077**	**,119**
F33	,787	-,103	,079	-,038	-,202
F41	**,460**	**,036**	**-,102**	**,532**	**,322**
F42	-,165	-,035	**,739**	,258	,108
F43	**,401**	**,311**	**,127**	**-,301**	**,327**
F51	**,322**	**,681**	**,184**	**-,092**	**,267**
F52	,207	-,023	**,629**	-,371	-,047
F53	**,272**	**,311**	**,628**	**,090**	**,165**
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.					
a. Rotation converged in 11 iterations.					

Table 4: Rotated Component Matrix[a]

Based on table 11, final factors that was still used in developing NEP instrument was factors such as ;F.11, F. 1.2., F.2.1., F.2.2., F.3.1., F.3.3., F.4.2., and F.5.2 (blue colors at table 4). Therefore, It was only 8 factors could be used continually in measuring people NEP, so there were 7 factors (red colors at table 4) should be omitted from the NEP instrument. These findings could be compared to table of specification at table 1 where it could be clear which factors and about what dimensions were not still used for future research.

Figure 3: Male NEP of Eigen Values

However, when factor analysis was conducted differently by separating male and female data of NEP, it was found that a number of factors which was required to be omitted were not differently significant, 7 factors for male and 8 factors for female (see table 5 and 6 altogether). It was surprisingly that for male and female factor analysis results, there were same factors should be omitted was factors number F.1.2. and F.1.3., the rest were complementary which means that supposed factor number F.4.1.and F.4.2. should be omitted for female NEP then those two were used for male NEP, reversely. That is what meant by complementary, therefore it was hard to be stated that male and female NEP as a result of factor analysis based on factor loadings was significantly different.

	Component					
	1	2	3	4	5	6
F11	.050	.038	.774	.237	.044	-.391
F12	-.086	.380	.628	-.369	.066	.114
F13	-.083	.097	-.050	.689	.365	.273
F21	.287	.098	.057	-.151	-.757	-.227
F22	.319	.077	.522	.082	.047	.223
F23	.700	-.083	.120	-.170	.147	.079
F31	.167	-.067	.047	.097	.065	.867
F32	.748	-.065	-.033	.324	.011	-.107
F33	.379	.054	.144	-.064	.753	-.166
F41	.522	.266	.265	-.345	-.169	.131
F42	-.040	.837	.136	.044	-.139	.094
F43	.445	.349	-.533	.016	.130	-.253
F51	.744	.165	-.072	.202	-.144	.242
F52	.223	.259	.186	.734	-.146	-.032
F53	.111	.787	-.004	.221	.114	-.203
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.						
a. Rotation converged in 14 iterations.						

Table 5: Male NEP Rotated Component Matrix[a]

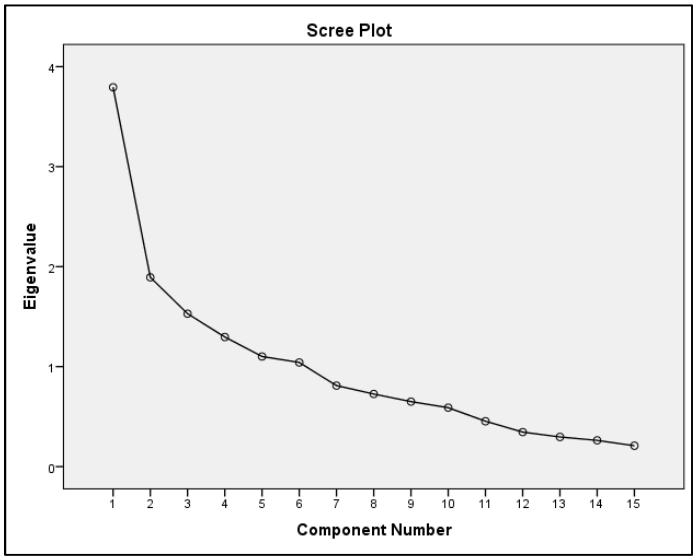

Figure 4: Female NEP of Eigen Values

	Component					
	1	2	3	4	5	6
F11	.076	.017	.084	.099	.872	.196
F12	.078	-.402	.612	.332	.070	-.079
F13	.757	.075	-.123	-.140	.363	-.028
F21	.210	.033	-.068	-.107	-.529	.445
F22	.166	.809	.036	.184	-.073	-.003
F23	.446	.213	.121	.583	.098	.314
F31	.383	.013	-.631	.463	.032	.068
F32	.772	.088	.224	-.167	.077	.011

F33	.215	.691	.149	-.395	.206	.138
F41	.087	.304	.756	.151	.110	-.041
F42	-.064	.026	-.084	-.041	.111	.869
F43	.588	.386	-.156	.062	-.184	-.139
F51	.817	.096	-.130	.087	-.199	-.096
F52	.286	.059	-.162	-.734	-.146	.218
F53	.760	.091	.079	.086	-.059	.321
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.						
a. Rotation converged in 16 iterations.						

Table 6: Female NEP Rotated Component Matrix[a]

5. Conclusion

Some conclusions could be derived from those research findings as follow: (1) For both variables, people NEP and people water conservation behavior could not be influenced by gender, when it was compared to male and female NEP and behavior, there were no difference found of means, reliability and even its eigen values or factor loading. (2) It has been proven empirically that people NEP has low reliability, even it has been applied around 62 items, and 33 items was valid, compared to what has been reported by research conducted by Waikato (2013), which used only 6 items, reliability was around .66ies as well. (3) People NEP, from this study, was not good predictor for people water conservation behavior, since its correlation was only significant at .27, therefore further research by involving some related variables, such as, people personality, locus of control, people knowledge about ecosystem, people intention to act, and situational factors (poverty) which theoretically affect directly or indirectly on people environmentally sound behavior could be studied in depth.

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