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Public Awareness on General Environmental and Sustainability Issues

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Abstract

Indonesia is situated within the 'ring of fire', a region characterised by a high risk of natural disasters, which encompasses a number of Indonesian cities, including Manado City. While numerous studies have examined post-disaster mitigation strategies, there is a paucity of research evaluating disaster prevention efforts, particularly in Indonesia and Manado City. This research employs transformative learning theory and general system theory to examine the efficacy of preventive efforts. It assesses the extent to which management functions can enhance the quality of human resources, thereby cultivating public awareness of environmental issues and sustainability. This research was designed as a quantitative study employing a survey approach and individual level of analysis, with a total of 387 respondents providing data. The results, obtained through the use of partially lease square structural equation model (PLS-SEM), indicate that the quality of human resources acts as a mediator in the relationship between controlling and environmental public awareness. The findings of this study indicate that the responsibility for building public awareness is not confined to a single organisation (the government). Rather, it necessitates a collaborative and cooperative approach involving various organisational divisions, with a view to transcending sectoral egos and achieving the objective of enhancing public awareness.

Keywords: Environmental and Sustainability, Management Function, Natural Disasters, Public Awareness, Ring of Fire.

Introduction

Indonesia is a country with a high risk of experiencing disasters, due to its location within the 'Ring of Fire', which increases the likelihood of natural disasters occurring (1). In general, the natural disasters that occur in Indonesia can be divided into two main categories: geological and hydrometeorological. One of the cities in Indonesia situated in close proximity to the 'Ring of Fire' is Manado City in North Sulawesi Province (2). Despite Manado City being classified by the National Disaster Management Agency (BNPB) as a medium disaster risk, given its location in North Sulawesi province and surrounded by other regions classified as high risk, the consequences of volcanic activity are also experienced by Manado City.

The city of Manado is situated on a hilly topography. As illustrated on the map of flood-prone areas from the Ministry of Agrarian Affairs and Spatial Planning, Manado City is classified as a high-risk area for natural disasters, particularly floods, tsunamis, and landslides. Furthermore, the geographical condition of Manado City, situated amidst mountainous terrain and traversed by five principal rivers, namely the Tikala and Tondano rivers, which converge in the Paal 2 region, the Malalayang river, the Sario river and the Bailang river, heightens the probability of natural disasters (3). To illustrate, on 15 January 2014, Manado city was subjected to a significant flash flood. Subsequently, in 2023, the city was once again affected by flooding, resulting in 377.3 hectares of impacted areas and affecting 49 locations across 34 villages and 9 sub-districts (3).

Prior research has demonstrated that natural disasters have direct implications for communities in a given area. In addition to the physical damage caused by the disaster, many families experience the loss of relatives as a result. The loss of loved ones and long-established homes represents a significant psychological stressor for residents, with the potential to precipitate the emergence of

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PTSD (Post Traumatic Stress Disorder) and other psychological disorders, including depression, psychosomatics, and anxiety (4). In the aftermath of a disaster, individuals frequently become susceptible and helpless to the traumatic effects of such events (5). In the aftermath of a disaster, governments and communities tend to prioritize logistical concerns, such as providing essentials like clothing, food, and shelter. However, this often results in a neglect of the family, community, and social level, as well as improvements to community and social institutions like markets, places of worship, livelihoods, and others. In other words, previous studies have concentrated on the actions that should be taken after a disaster has occurred (6). Substantial research and numerous initiatives have been dedicated to understanding and addressing natural disaster risks in Indonesia, including regions in Eastern Indonesia. Prior research has examined the relationship between local wisdom and religious approaches to disaster management in Indonesia (7, 8). Furthermore, the knowledge management approach is also associated with disaster preparedness, as evidenced by research on the relationship between local wisdom and religious approaches to disaster management in Indonesia (9). Nevertheless, there has been a paucity of research exploring the potential preventive measures that could be employed to mitigate the risk of natural disasters, particularly in regions of Eastern Indonesia such as Manado City.

This study, therefore, seeks to address the existing research gap by focusing on preventive measures to enhance public awareness. It is imperative that a public awareness movement be cultivated in response to the global phenomena of climate change and the extensive damage it has inflicted upon ecosystems (10). Public awareness of the significance of environmental issues represents an anticipatory step to mitigate the risk of greater natural disasters resulting from human negligence. While it is not a panacea for the potential for natural disasters, it is reasonable to posit that individuals who are environmentally aware will be more motivated by their hearts and minds to create a cleaner, more environmentally friendly environment (11). Consequently, the risk of greater natural disasters may be reduced. One of the most pressing issues currently facing society is the lack of environmental awareness among the general public. To illustrate, the act of raising public awareness regarding the proper disposal of garbage may initially appear to be a relatively minor individual action. However, if this awareness is effectively mobilized into a broader public movement, it has the potential to significantly reduce the adverse impact of plastic garbage on flood prevention efforts, particularly in terms of its obstruction of waterways.

The Ministry of Environment and Forestry of the Republic of Indonesia has announced that the Environmental Quality Index (IKLH) for the country as a whole in 2023 was 72.54 points, representing an increase from the previous year (12). In North Sulawesi, particularly in Manado City, the IKLH is higher than the national average. However, the same report indicates that public awareness of environmental and sustainability issues remains a significant area for development.

Despite the growing body of evidence demonstrating the detrimental effects of human activities on the natural environment, there are still segments of the population that either fail to recognize these impacts. It can be argued that the government and non-governmental organizations (NGOs) have a significant role to play in raising environmental awareness.

The creation of public awareness necessitates the implementation of efficacious and expeditious managerial strategies. It can therefore be posited that management functions may serve as appropriate predictors. Nevertheless, it is important to note that despite the effectiveness of planning, organising, actuating and controlling (POAC) in fostering public awareness, the formation of environmental awareness remains challenging to influence without the support of a quality human resource (HR) base within the community. Prior research indicates that a high-quality workforce can yield substantial benefits in a range of contexts (13–15). Consequently, the calibre of human resources may serve as a crucial intervening factor in the relationship between organisational management (e.g. local government) and public awareness formation.

In light of the aforementioned background, the objective of this study is to investigate the causal relationship between POAC and the public awareness of environmental issues, with the quality of human resources serving as a mediating variable. This research was conducted in Manado

City, North Sulawesi Province, Indonesia. Manado was selected as the research location due to its geographic position as a disaster-prone area (see previous explanation).

Transformative learning theory (TLT) (16) provides a theoretical framework that can be used to explain how individuals' experiences, knowledge, and learning can lead to a change in their understanding and valuation of their environment. Previous research has indicated that TLT places an emphasis on how individuals can undergo a paradigm shift through critical reflection on their experiences, beliefs, and values (17, 18). In the context of environmental education, this theory posits that to effectively cultivate environmental awareness, learning must encompass not only the dissemination of information but also the cultivation of critical thinking and the assessment of individuals' perspectives on environmental issues. By integrating these elements, education can facilitate substantial shifts in attitudes and behaviors pertaining to environmental conservation.

The concept of General Systems Theory (GST), (19) postulates that any given organization or system is constituted by a set of interconnected and interacting parts. GST underscores the significance of grasping the manner in which constituent elements within a system operate as a unified entity and the potential ramifications of alterations in one component on other components. In the domain of environmental management, GST elucidates the manner in which disparate elements, including policies, programs, and individual behaviors, interact and exert influence on the ultimate environmental outcomes. The theory espouses the view that efficacious environmental management necessitates a systemic approach that considers the relationships and interactions between diverse factors.

The integration of TLT and GST theories within the domain of environmental education and management offers a comprehensive framework for elucidating the interrelationship between learning and systems, and the enhancement of environmental awareness. The TLT approach facilitates the development of educational programs that not only impart information but also prompt participants to engage in reflection and modify their perspectives on environmental issues. While GST emphasizes the necessity of a systemic methodology in the design and implementation of efficacious environmental programs, it also underscores the importance of considering the interrelationships between various elements.

In practice, integrating TLT and GST in planning, organizing, acting, and controlling (POAC) environmental programs allows for a comprehensive, holistic approach. Planning should consider how learning experiences can be designed to facilitate perspective transformation, while organizing ensures that all elements of the system support this goal. Actuating focuses on applying learning to change behavior, and controlling assesses the impact of those changes within the broader system context. As such, these two theories provide tools and approaches for creating more effective and sustainable programs to increase pro-environmental awareness and action.

The established George Terry functions of management are POAC. The planning function represents the initial stage in the process of engaging the organisation to ascertain the objectives or actions that are required to achieve the desired outcomes. A substantial body of research indicates that the implementation of an effective strategic planning process is fundamental to ensuring that the organisation's activities are aligned with its objectives and that its desired outcomes are achieved. It is communities that are most vulnerable to the impacts of climate change; thus, it is imperative that they adapt in order to enhance their capacity to survive amidst climate change issues. A pivotal element in addressing environmental change is government policy and planning (20). It is essential that future government plans encourage people to be aware of the potential risks associated with environmental change, increase their understanding of the available response options, and empower them to take action independently (21).

The organisational function is associated with the efficacy of organisational structures and the capacity for flexibility and adaptation in the context of a changing world (22). Furthermore, the organisational function constitutes a clear delineation of tasks and responsibilities, thereby facilitating collaboration and coordination (23). Organisational mistakes can result in a lack of innovation and a reduced capacity to adapt to a changing environment (24). A survey of 25

countries shows that flexible organising can have a positive impact on organisational sustainability (25). Furthermore, a flexible organisational structure that is capable of rapid adaptation will facilitate the effective transfer of knowledge from the organisation to the community and vice versa (26). It can be reasonably deduced that the organization's objective of fostering public consciousness regarding the significance of environmental stewardship and sustainability may be more effectively accomplished if the organization is comprised of individuals who possess the requisite qualifications and a flexible organizational structure that is well-versed in the nuances of the community (27).

The actuating function, which may also be referred to as the leading function, serves to motivate, direct, and lead members of an organization, encouraging their willingness to carry out the plans that have been set forth. This function facilitates effective and directed communication, enabling all members of the organization to work collectively towards the achievement of shared organizational goals (28). The role of communication in fostering awareness and motivation is particularly crucial in the context of environmental issues, particularly when conducted in a sustainable manner (29). For instance, coastal communities may enhance their business capacity by initiating communication-based awareness-raising initiatives (30).

The final function, control, encompasses the monitoring and evaluation of programs and strategies, in addition to organizational goals. An effective control system enables the identification of potential deviations from plans and actions (31). In the event of a significant deviation, corrective action must be taken. The objective of control is to monitor organizational performance in real-time. The manner in which tasks are controlled by management has an impact on organisational learning, which in turn affects task performance (32). Furthermore, the control exerted by management tends to engender behaviours that are cooperative, persistent and initiative. In other words, the role of management is to facilitate change in behaviour, particularly in a society that is increasingly aware of the need to protect the environment.

The quality of human resources can be a determining factor in the promotion of public awareness of the environment. Furthermore, the effectiveness of human resources in this regard can serve as a mediating factor in the causal relationship between management functions and efforts to build public awareness of the environment. The advancement of human resources (HR) necessitates the active involvement of the community at each stage of the process. This entails ensuring that all individuals are afforded an equal opportunity to attain prosperity (33). The achievement of national development is contingent upon the advancement of human development. Consequently, the quality of the human element is a pivotal determinant of sustainable development. Illustratively, the expansion of educational access at all levels of society can enhance the caliber of human resources and stimulate economic growth. Similarly, the enhancement of nationwide health services can augment life expectancy and elevate worker productivity.

The Central Bureau of Statistics (BPS) of Indonesia employs a multidimensional approach to measuring the quality of human resources, encompassing the levels of health, education, and economic development within a given community. In the case of North Sulawesi, the average growth in the quality of education and health from 2020 to 2023 was less than 1% per year, while economic growth reached 2% per year (34).

TLT posits that efficacious and suitable education and learning can transform the mindset and behavior of individuals, integrating environmental sustainability into their perceptions and values (16). It can be reasonably assumed that individuals who possess a sufficient level of knowledge and education will demonstrate an openness to and active engagement with the plans, programs, and strategies of an organization (e.g., local government) aimed at promoting the sustainability of the community's environment. In general, effective organizational planning, as evidenced by the implementation of socialization programs, environmental education and training, will ultimately lead to an increased public awareness of environmental issues.

An additional indicator of the quality of human capital is the level of health. This is a significant indicator that can provide insight into the physical, mental, and social well-being of a population (35). For example, the existence of a healthy, clean, and safe environment can contribute to enhanced

public health outcomes by mitigating the risk of disease and improving the overall quality of life. Furthermore, the accessibility and caliber of healthcare services in the surrounding area enable individuals to obtain the necessary healthcare services. Alterations in public awareness behaviors are postulated to be influenced by the manner in which the organizational structure and personnel involved in promoting healthcare services can be enhanced, which in turn will facilitate the development of public awareness. GST posits that organizations are systems comprising interrelated components (19). This theory posits that organizing constitutes a form of management and coordination of diverse organizational elements (including the community) that can influence the health and environmental awareness of the community.

The economic level of a community can be defined as the economic well-being of individuals and/or communities. This encompasses factors such as adequate income, employment opportunities, and access to economic resources. Changes in the economic level of the community represent a significant aspect of environmental change or climate change (36). The community's economy is regarded as a mediating factor in the causal relationship between actuating and environmental awareness. This is due to the fact that a relatively stable economy can provide sufficient time and capacity for individuals to direct attention and engage in environmental activities (37). In other words, if people are economically deprived, they may prioritize economic concerns over engagement in environmental improvement. Furthermore, economic prosperity provides access to resources and technologies that can be utilized to support pro-environmental actions, such as investments in renewable energy or sustainable agricultural practices. Consequently, wealthier communities are more likely to engage in environmental conservation efforts (38).

The role of management in improving the quality of human resources (HR), which encompasses education, health, and the economy, is of significant importance. This, in turn, will have an impact on people's awareness of the environment. Through effective supervision of education and training programs, controlling ensures that people obtain and receive adequate programs or plans and knowledge on environmental issues. Performance evaluation in the health sector enables corrective action to improve environmental conditions that affect public health. Furthermore, well-controlled sustainable economic management ensures that economic initiatives support community well-being while maintaining environmental sustainability. High-quality human capital, the result of effective management, further enhances people's environmental awareness (39).

In light of the aforementioned explanation, the quality of HR is regarded as a potential mediator in the relationship between POAC and the formation of public awareness of the environment. This is predicated on the assumption that effective planning can facilitate the organization and implementation of successful initiatives, which in turn enhances the quality of human resources. The quality of human resources, which encompasses relevant education, good health, and economic well-being, serves to enhance environmental awareness. Conversely, effective control ensures that all elements in POAC function properly, thereby improving both the quality of HR and environmental awareness. Based on this, the following hypothesis is proposed:

H1. All management functions (POAC) affect public awareness of the importance of the environment, which is mediated by the quality of HR.

H2. The quality of HR has a positive effect on the formation of public awareness of the importance of the environment.

Methodology

In accordance with the research hypothesis, a research model can be constructed, as illustrated below.

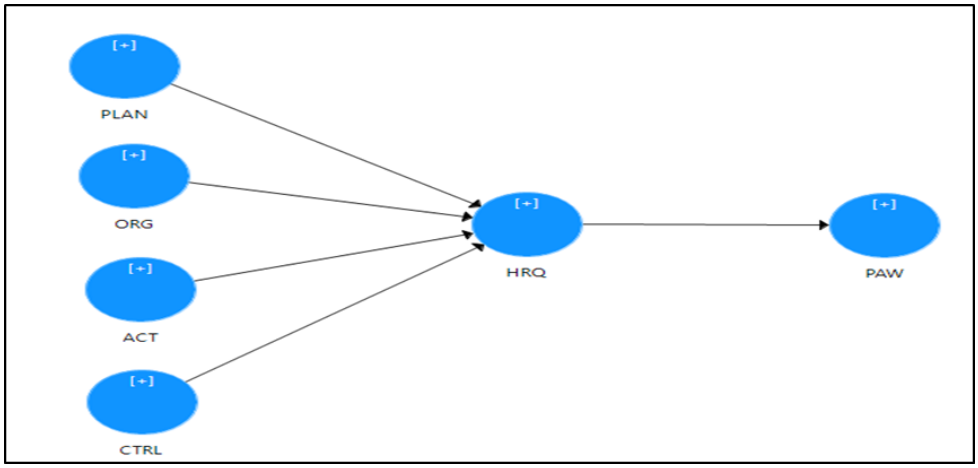

Figure 1: Research Model (Note: PLAN: planning; ORG: organizing; ACT: actuating; CTRL: controlling; HRQ: Quality HR; PAW: public awareness)

This study used a quantitative associative research methodology with a survey-based design to confirm the causal relationship described in the literature review. The study population consisted of individuals residing in all urban villages of Manado City who were 17 years of age or older and below 17 years old if were married. The age of 17 was selected as the cut-off point for inclusion in the study, as it is generally considered to be the age at which individuals have reached sufficient maturity to provide informed consent and to participate in research activities.

Manado, the capital of North Sulawesi Province in Indonesia, was selected as the research site due to its geographic location within the "Ring of Fire". Additionally, Manado is situated in a low-lying coastal area surrounded by watersheds, making it particularly vulnerable to flooding. The city experiences frequent flooding due to the overflow of rivers from highland areas, such as Tomohon/Tondano City, and high tides that reduce the flow of water into the sea (2). The total population of Manado city for individuals aged 17 years and above was 355,588 in 2023 (40). This study targeted a sample size of 500 data points distributed across various urban villages in Manado city. Between June and August 2024, the complete data set comprised 387 samples, representing an 77.40% response rate.

The data were collected using the Google Forms application for keeping data safe and distributed directly to the people in Manado City with the assistance of the Manado City Disaster Management Agency (BPBD Manado) and all local governments in Manado City. The unit of analysis in this study was the individual, who assessed the conditions where he or she stayed, based on his/her personal perception of the research construct.

Measurement

The BPBD Manado is an organization under the Manado city government that has the task of assisting the city government in planning, coordinating, facilitating policy formulation, and implementing disaster management under the authority of the Manado city government. In other words, the BPBD Manado is responsible for preventive and reactive actions against natural disasters in Manado city. In this study, the BPBD Manado could take the form of preventive action by raising public awareness of environmental concerns.

The term "management function" is a multidimensional construct, comprising four distinct yet interrelated constructs: planning, organizing, actuating, and controlling (POAC). In other words, POAC itself is constituted by four latent or exogenous variables. The POAC is evaluated based on the perceptions of the general public regarding the management functions that have been executed by the Manado City Government, specifically the BPBD Manado. In other words, the people of Manado City were presented with a series of statements, which they were invited to assess or express opinions regarding the planning, organizing, actuating, and controlling of BPBD Manado. POAC was measured by an instrument developed by the researcher based on the literature of management principles (41). The planning process comprises 10 statement indicator items, while the organizing phase encompasses 10 indicator items. Similarly,

the actuating stage involves 10 indicator items, and the controlling phase also comprises 10 statement indicators.

The quality of HR in Manado City is defined as the public perception of the level and quality of education, health, and economic services experienced by the city's residents. This quality is assessed using nine statement indicators, with the research instrument developed based on the Human Development Index (HDI) measure reported by the Central Bureau of Statistics, Indonesia (BPS) (42).

The measurement of public awareness can be understood as a means of gauging the public perception of the knowledge, attitudes, and practices (KAP). The KAP questionnaire is designed to collect data pertaining to three key areas: knowledge, attitudes, and behaviors or practices. In this case, the questionnaire is employed to assess knowledge, attitudes, and behaviors or practices related to environmental issues. This construct is measured by nine statement items developed based on previous studies that have examined KAP with respect to the environment (43).

ChatGPT 4.0 was employed in the preliminary stages of the research instrument's development. The prompts used were as follows: i) The creation of a research questionnaire perceived by the public related to the variables of planning, organising, actuating and controlling, with the main reference of George Terry. ii) The development of a human development index questionnaire commonly used by the Indonesia, Central Bureau of Statistics. iii) The creation of a public awareness questionnaire on the environment with the KAP dimension, with the main reference of Stern. However, to ensure the appropriateness of the ChatGPT instrument, the initial design was discussed once more by the researcher with competent external peer reviewers from various experts at several universities in North Sulawesi. The results of the discussion were used as the primary basis for determining the questionnaire to be distributed to respondents. This was done as a form of face validity and content validity, and to ensure the role of humans was not eliminated. Furthermore, all statements are measured on a Likert scale of 1-5 (strongly disagree to strongly agree).

Validity and Reliability

The assessment of the measurement scale was conducted to evaluate the research instrument's capacity for accurately measuring the research construct. The assessment encompassed three key areas: convergent validity, discriminant validity, and reliability. Respondents were invited to share their opinions by indicating their response to each scale item. However, these responses may have contained a subjective element, to address this issue, the questionnaire did not inquire about the respondent's name. This approach was employed to enhance the objectivity of the responses (44).

The empirical validity test employed the use of confirmatory factor analysis (CFA), encompassing both convergent validity and internal consistency (45). A crucial element in establishing convergence validity is the aggregation of instrument variables that can effectively describe the research construct. Convergent validity can be evaluated based on the factor loading value, which coalesces in a single factor. Subsequently, the average variance extracted (AVE) value is considered. In order for variable instrument elements to demonstrate convergent validity, the outer loading must be higher than 0.5, there must be no cross-loading issues, and the average variance extracted (AVE) value must be higher than 0.5 (46). Following the evaluation of convergent validity, the subsequent stage is the assessment of internal consistency (Cronbach's alpha and composite reliability). An instrument is deemed reliable if the Cronbach's alpha value is greater than 0.6 and the composite reliability value is greater than 0.7 (45).

Table 1: The Results of the Validity and Reliability Assessment

Constructs	Remaining Item	AVE	Cronbach Alpha	Composite reliability
Planning (PLAN)	10 from 10	0.760	0.964	0.969
Organizing (ORG)	10 from 10	0.766	0.966	0.97
Actuating (ACT)	10 from 10	0.697	0.945	0.954
Controlling (CTRL)	10 from 10	0.734	0.959	0.965
Quality HR (HRQ)	10 from 10	0.556	0.919	0.932
Public awareness (PAW)	9 from 9	0.656	0.940	0.949

Table 1 indicates that no items should be excluded, as all items exhibit an outer loading value exceeding 0.500 and generate an AVE value that is also above 0.500. Similarly, the reliability of each construct is also satisfactory, with all values, both Cronbach alpha and composite reliability, exceeding the 0.600 (Cronbach alpha) and 0.700 (composite reliability) thresholds. Even the reliability values presented in Table 1 are ideal score (47). In other words, the results presented in Table 1 provide evidence that the research constructs have met the criteria for convergent validity (48).

Once the convergent validity test has been completed, the discriminant validity test is then carried out in order to ensure that each research construct is indeed a unique construct (49). In this study, the criterion of discriminant validity is operationalized using the Heterotrait-Monotrait (HTMT) criterion.

Table 2: Heterotrait-Monotrait (HTMT)

	ACT	CTRL	HRQ	ORG	PAW
ACT					
CTRL	0.839				
HRQ	0.874	0.896			
ORG	0.841	0.813	0.881		
PAW	0.824	0.871	0.837	0.862	
PLAN	0.698	0.64	0.691	0.786	0.681

Note: PLAN: planning; ORG: organizing; ACT: actuating; CTRL: controlling; HRQ: Quality HR; PAW: public awareness

A HTMT value below 0.900 suggests that the research constructs can be regarded as unique or distinct from one another (50). In light of the evidence presented in Table 2, it can be concluded that each research construct is unique, or in other words, it passes the discriminant validity test.

Technique of Analysis Data

The research hypotheses were tested using a partial least squares-structural equation modeling (PLS-SEM) approach with the SmartPLS 3.29 software. PLS-SEM has been described as a "silver bullet" due to its robust statistical capabilities in testing hypotheses with limited sample sizes and its resilience to classical assumption-related issues (51). PLS-SEM is considered a non-parametric statistical method that examines multidimensional processes and complex relationship patterns. This multivariate technique merges regression aspects and analytical factors to assess theory relationships simultaneously. The bootstrapping method is used for hypothesis testing, and if the t-statistic value is higher than 1.960 (95% confidence level), the hypothesis can be deemed supported.

The exact nature of the mediating effect must be delineated to be included in the analysis. The test on mediating effect is not merely an instrument for gauging the impact of the direct relationship between the independent and dependent variables. It is also a means of measuring the effect of the indirect relationship between them, with the use of a mediating variable (52).

Profile Respondent

In this study, the accumulated data comprised 387 valid responses from a total of 500 questionnaires that were distributed to various communities in Manado city. From the sample of 387 participants, 207 individuals (or 53.48%) were male, and 180 or 46.52%) were female.

The average age of the 271 respondents was 35, which is considered to be within the productive age bracket and the millennial demographic. The highest proportion of respondents held a high school's degree, with 196 individuals (50.64%), followed by 39 with a master/doctor's degree (10.07%), and 135 bachelor/equivalent graduates (34.88%) and 15 below high school (3,87%) . Most of the community (275 individuals or 71.05%) were in the age range of 43 years and above, with a relatively small portion at age level between 17 – 43 (20.90%) and below 17 married. On average, the respondents reported earning a higher than minimum North Sulawesi wage. Detailed information regarding the profile of the respondents can be found in Table 3.

Table 3: Profile Respondent

	Percentage
Sex:	
Male	53.48
Female	46.52
Education:	
Bachelor/Equivalent	34.88
Graduate (Master/doctor)	10.07
High School	50.64
Below high school	3.87
Age:	
Below 17 married	7.80
17 – 43	20.90
Higher than 43	71.20
Income:	
Higher than North Sulawesi Minimum wage	82.20
Below than North Sulawesi Minimum wage	17.80

Results

Once the research instrument has been validated, the subsequent step is to test the hypothesis. As previously stated, hypothesis testing is conducted using partial least squares structural equation modelling (PLS-SEM). The results are presented in Figure 2. As illustrated in Figure 2, the POAC management function, specifically the controlling function, exerts a notable influence on the quality of human resources, which in turn has a favourable impact on public awareness. The T-statistic value (3.250) for the controlling function in relation to HR quality is above the threshold of 1.960. The functions of planning (T-Stat 1.308), organising (T-Stat 1.387), and actuating (T-Stat 0.733) exert only an insignificant effect, as evidenced by T-Stat values that fall below the 1.960 threshold.

As evidenced in Table 4, it is clear that the controlling management function is the sole entity capable of influencing public awareness through the quality of HR. The results of the specific indirect effect demonstrate that the quality of HR is a significant mediating factor in the causal relationship between controlling and public awareness, with a T-Stat value of 3.147 and a P-value of .002. Consequently, hypothesis 1 is only partially confirmed, as the management functions of planning, organizing, and actuating are found to have no significant effect on public awareness through the quality of human resources.

The quality of human resources, as illustrated in Figure 2, is identified as a highly significant factor influencing public awareness. The T-Stat value of HR quality on public awareness is 35,183, a notably high value from 1,960. This outcome underscores the pivotal role of human resource management in propelling environmental sustainability within communities. In other words, this outcome substantiates the empirical evidence supporting hypothesis 2 of the study.

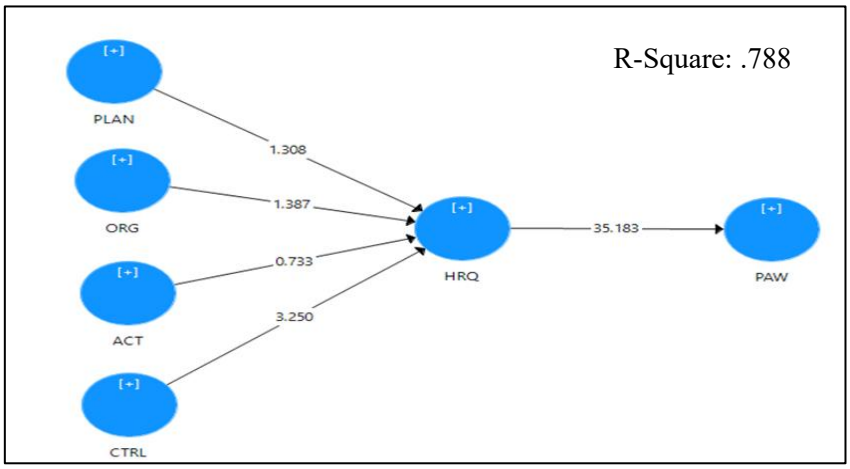

Figure 2: Model of Research Result (Note: PLAN: planning; ORG: organizing; ACT: actuating; CTRL: controlling; HRQ: Quality HR; PAW: public awareness)

Table 4: Specific Indirect Effect

	O Value	Mean	SD	T-Stat	P-Values
ACT→HRQ→PAW	0.108	0.135	0.147	0.73	0.466
CTRL→HRQ→ PAW	0.434	0.439	0.138	3.147*	0.002*
ORG→HRQ→PAW	0.175	0.162	0.127	1.385	0.166
PLAN→HRQ→PAW	0.121	0.109	0.093	1.298	0.194

Note: PLAN: planning; ORG: organizing; ACT: actuating; CTRL: controlling; HRQ: Quality HR; PAW: public awareness; *Significant

Discussion

The results of the study indicate that the most impactful POAC management function is controlling or evaluation, whereas the planning, organizing, and actuating (POA) function has not had a significant impact. However, this result does not imply that the most important management function is controlling. Instead, it suggests that the implementation of a well-supervised plan is more positively valued by the community, as the impact seems to be felt by the community directly. In other words, POA is a management function that may be less visible in the community, whereas controlling the strategic plans and programs of organizations (e.g., local government) appears to be more visible. POAC is an indispensable component of effective organizational management. Without a comprehensive approach to planning, organizing, actuating, and controlling, it is challenging to achieve optimal outcomes in terms of HR quality and community awareness. This assertion is supported by the R-squared value of .788, which demonstrates a robust research model capable of explaining 78.8% of the variance in the endogenous variables. This model requires the inclusion of exogenous variables, as illustrated in Figure 1 (53). In other words, an organization, in this case the local government, that aims to cultivate a more environmentally conscious public must prioritize the effective functioning of the POAC function and the quality of human resources that resonates with the community.

The results of the study also provide valuable information, even in cases where the POAC function has been executed effectively. However, it is evident that the implementation of control mechanisms will not yield positive outcomes in the formation of an environmentally aware society unless the quality of HR within the community is adequately developed. Previous studies have elucidated that the quality of human resources will be a pivotal factor in enhancing public awareness of environmental issues (54, 55).

In consideration of the findings of this study, it is evident that the cultivation of public awareness regarding a given community is not the exclusive domain of a single individual or entity. It is imperative that all elements of society cooperate, collaborate, and unite. For example, the BPBD Manado, despite its duties and responsibilities in disaster management in Manado City, is unable to function effectively without the cooperation and collaboration of other relevant agencies, including the Manado city Health Office, Education Office, Cooperative and UMKM Office, etc. Furthermore, the quality of human resources is contingent upon a number of interrelated factors, including educational, health, and economic issues. Consequently, it is imperative that the BPBD Manado and the aforementioned agencies demonstrate the capacity and willingness to transcend sectoral ego. Manado is renowned for the '*mapalus'* tradition, which signifies cooperation and collaboration in pursuit of shared welfare objectives (56, 57). This tradition underscores the indispensable role of mutual cooperation between Manado City Government agencies and the community in fostering a flourishing and environmentally awareness society. In light of the imminent threat of climate change, it is imperative to expeditiously supplant individualistic attitudes with those espousing '*mapalus*' values and behaviors.

Conclusion

In light of the aforementioned research, it can be posited that in the context of the imminent threat of climate change cannot be addressed in isolation. It is evident that the community cannot be left to address the negative impacts of climate change and natural disasters in the absence of external assistance. It is imperative that local governments and NGOs disseminate knowledge and information to the community regarding the significance of environmental sustainability.

The findings indicate that the quality of HR is a pivotal factor in fostering public awareness.

Regardless of the efficacy of the plans and actions implemented in the field, the absence of an adequate quality of education, health, and economic opportunities renders the development of public awareness challenging, let alone the expectation of community participation. Consequently, all constituent parts of the organization must collaborate harmoniously and transcend their respective egos. In other words, the objective of the environmental awareness movement is not only the community, but the entire community with stakeholders.

The quality of education must be improved by developing adequate educational facilities up to the urban village level. Additionally, health facilities at the smallest level in Manado City also need to be considered, as well as access to employment opportunities or businesses. A prosperous society will facilitate a greater understanding of environmental issues.

Abbreviation

Nil.

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Author Contributions

Donald Sambuaga is a doctoral student of Universitas Negeri Manado enrolled in the Education Management programme. Tinneke Evie Meggy Sumual, Orbanus Naharia, Victory NJ Rotty are supervisors who have provided advice and input for the preparation of this scientific work.

Conflict of Interest

There is no conflict interest.

Ethics Approval

Not applicable.

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