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Media Synchronicity in Developing Bahavior to Rehabilitate Rivers From Domestic Waste

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A b s t r a c t

Nowadays, the world is experiencing climate change and water pollution which can have bad impact on many aspects. Thus, the purpose of this study is to analyze the relationship between media synchronicity and task performance and communication performance in rehabilitating rivers from domestic waste in the Citarum Harum program. This study uses survey and the withdrawal technique uses multi-clustering, by choosing an area that is very close to the river which is the target of the Citarum Harum Program. The population is taken from two villages in Bandung Regency with heavily polluted river water quality status and uses multiple correlation coefficients and structural equation modeling partial least squares 3 as the data analysis technique. It shows a weak relationship between communication process variables and task performance and a negative relationship between the effects of moderation on communication performance. So, it is necessary to develop further models to improve these sub-variables.

Keywords: Environmental Communication; Media Choice; Communication Process; Task Performance; Communication Performance.

Introduction

Climate change has been recognized as an important area for the global community around the world. The threat of global warming is increasing rapidly due to the anthropogenic impact on the environment. The impact of climate change on water supply is a serious problem in developing countries. In China, a large number of studies report many topics related to water pollution and climate change (Son et al., 2019). In Malaysia, climate change has resulted in a decrease in national food security and threatens the availability of drinking water (Elijah et al., 2018), (Junsheng et al., 2019). In India, per capita water availability has decreased by 70%. Meanwhile, the country needs water availability for agricultural irrigation (Sharma, 2019), (Paudel et al., 2020) (Zainal et al., 2021).

Jordan is a country with scarcity of clean water supply hamper social welfare and economic development. There are two kinds of approach used in the perspective of development communication. The first approach is the implementation of communication strategies using the media (Borgias, 2018), (Tourigny & Filion, 2020), (Thaker et al., 2019). The second approach prioritizes changes in attitudes and behavior that are targeted at stakeholder which is the target of the program (Mukti et al., 2022), (Firmansyah et al., 2022).

Research that has been done previously raised the issue of water and river pollution, many of which used a media approach. The choice of media is adjusted to the characteristics of the target community (Zaenudin & Komariah, 2022), (Shahreza et al., 2020). Mass media is widely used in developing countries because television and radio are easily accessible mediums community (Skrinar et al., 2019),(Kakalou et al., 2019). Meanwhile, in developed countries people choose new media that are more interactive. New media are quickly becoming a marketing tool for promoting an organization's mission. Many residents use social media to post photos of various environmental problems such as littering and chemicals into rivers (Fox, 2020), (Son et al., 2019).

Research on building task performance and communication to rehabilitate rivers using media simultaneously is still minimal (Thomas et al., 2023), (Jong et al., 2021) In fact, the use of several media simultaneously will result in better communication performance (Torro et al., 2022), (Randolph et al., 2022). This is also due to the fact that there is no single medium that provides an ideal combination of capabilities for conveying and interpreting information. In supporting remote workers, the media team should consider the communication process and capabilities of the media for different tasks.

The novelty of the research conducted is that it utilizes a variety of different media synchronically (simultaneously) to address the issue of river water pollution in a development communication perspective to build communication performance and task performance. Fifty articles were collected using the prism technique which then made a summary.The media synchronicity approach does not only focus on the issue of waste water management alone, but also on efforts to reduce environmental impact from domestic waste (Torro et al., 2022), (Jong et al., 2021), (Thomas et al., 2023).

Contextual pollution of water and rivers in Indonesia with a media approach has been carried out since 2018. Solving environmental problems in the *Citarum Harum* Program in West Java uses different media characteristics at the same time or synchronicity (Son et al., 2019), (Kashian & Mirzaei, 2019). The characteristics of the variety of media used start from direct communication, print media, and electronic media to new media. Media synchronicity is a shared pattern of using many media characteristics in a coordinated synchronous manner with the same task (Son et al., 2019), (Kashian & Mirzaei, 2019).

Based on the research background, the research problem formulation was made with the aim of, among other things, analyzing the influence of the relationship between media synchronicity and task performance and communication performance in rehabilitating rivers from domestic waste in the *Citarum Harum* program.

Research Method

The research design used a survey method because of the large population. Researcher first formulates a theoretical understanding of the problem to be studied. After that, collect data to find empirical support for the theory (Charli et al., 2022). The research provides an explanation of the causal relationship of variable x, namely media choice, media capability, communication process, and variable y, namely task performance and communication performance, through hypothesis testing as well as conducting explanations.

The sampling procedure for this research uses multi-stage sampling or clustering sampling. Clustering sampling is an ideal sampling procedure when it is difficult to collect a list of all the elements that make up a population. The first stage is based on a map of the pollution source area, Bandung Regency is one of the areas in the Bandung Basin, which is prone to flooding due to piles of garbage that clog rivers during the rainy season. The second phase selected several villages that are very close to the river. Two villages namely Andir Village and Bojong Malaka are villages with a distance of 100 meters from the river and are the targets of the *Citarum Harum* program. At the third stage determination of the sample using the slovin formula with a significance level of $\alpha = 0.1$. From a population of 700 family heads, the sample taken was 203 family heads. Data analysis techniques in this research use structural equation modeling partial least squares 3. Confirmatory factor testing uses the second order where the test is through two levels. First, the analysis is

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carried out from latent constructs to indicators. Second, the analysis was carried out from latent constructs to construct dimensions (Sarstedt et al., 2020).

Results & Discussion

Media synchronicity theory has the premise that the goal of communication is task performance and communication performance. A media has physical characteristics that can be seen from its features for producing symbols (text, images, audio, video), sending information quickly, sending symbols simultaneously (parallelism) and documenting copies of messages. The main thesis of media synchronicity theory is that communication performance comes from matching media capabilities with the communication processes required for communication performance and completing tasks (Damali et al., 2022), (Thomas et al., 2023).

Various media with the aim of conveyance (submission of information) program initiators use asynchronous communication such as through posters, television and radio. Meanwhile for the purpose of convergence (interpretation of information), program initiators use synchronous communication such as house-to-house socialization, mutual cooperation activities and social media. The difference between communication processes (conveyance and convergence) indicates that different communication processes require different media capabilities (Damali et al., 2022), (Thomas et al., 2023), (Jong et al., 2021).

Quantitative Data Processing

Processing the standard deviation with SEM-PLS 3 software is to analyze the level of variation or spread of data in the sample. Some specific goals of processing the standard deviation with SEM-PLS 3 are to find out the data in concentrated or dispersed samples, predicting the accuracy of the model made, because a smaller standard deviation indicates that the data is more concentrated and the model is more accurate, the sample size needed to achieve certain level of confidence with a given level of accuracy.

Table 1
Overall mean value and standard deviation (SD)

	Mean	Median	Min	Max	Std. Dev	Excess Kurtosis	Skewness
X1.1	24,158	25,000	14,000	37,000	4,838	-0,358	0,151
X1.2	24,262	24,000	15,000	37,000	4,737	-0,554	0,185
X1.3	24,926	25,000	14,000	36,000	5,081	-0,530	0,163
X1.4	24,173	24,000	15,000	37,000	4,867	-0,590	0,071
X2.1	50,317	50,000	30,000	74,000	9,961	-0,241	0,261
X2.2	74,955	76,000	46,000	109,000	14,573	-0,459	0,103
X2.3	24,673	25,000	13,000	36,000	5,123	-0,738	-0,124
X2.4	74,856	76,000	43,000	109,000	15,025	-0,654	-0,060
X2.5	52,272	53,000	30,000	75,000	10,415	-0,460	-0,017
X3.1	67,050	67,000	37,000	106,000	13,772	0,214	0,229
X3.2	67,035	68,000	43,000	106,000	12,492	-0,007	0,030
X3.3	84,589	86,000	51,000	143,000	16,200	0,663	0,186
Y1.1	23,589	24,000	13,000	35,000	4,508	-0,336	-0,151
Y1.2	51,228	52,000	29,000	72,000	9,853	-0,603	-0,086
Y1.3	25,624	26,000	14,000	37,000	4,927	-0,597	-0,123
Y2.1	48,728	49,000	28,000	72,000	9,768	-0,513	0,061
Y2.2	49,010	49,000	29,000	72,000	9,810	-0,596	0,154
Y2.3	24,084	24,000	15,000	37,000	4,951	-0,631	0,058

Based on the data provided, the variables X1, X2, and X3 have significantly different average values. X3 has the highest average value of 84.589, while X1 has the lowest average value of 24.158. The variables Y1 and Y2 have nearly the same mean values, both around 49,000. The median values for X1, X3, and Y1 are very close to their respective means, indicating that the data are symmetrically distributed. For the other variables, the median is slightly lower than the mean, indicating a distribution that is slightly skewed towards higher values. Minimum and maximum values for all variables vary widely, with X3 having the widest range (51,000 to 143,000). X1, X2, and Y1 range from 23,000 to 37,000, 30,000 to 109,000, and 13,000 to 35,000, respectively.

Standard deviation values for all variables are in the range of 4,508 to 16,200. Variables X3 and X2.4 have the highest standard deviation values of 16,200 and 15,025 respectively which indicate a relatively large level of data variability. Variable Y1.1 has the lowest standard deviation value of 4.508, indicating a relatively small level of data variability. Overall, the data set appears to have a wide range of values, with some variables showing high levels of variability. However, the

median values for most of the variables are relatively close to their respective means respectively, indicating that the data is symmetrically distributed.

Validity and Reliability Test

The rule of thumb that is usually used to assess construct reliability is that the Composite Reliability value must be greater than 0.7 for confirmatory research and a value of 0.6-0.7 is still acceptable for exploratory research (Sanmukhiya, 2020). If all indicators are standardized, then this measure is the same as average communalities. Fornell and Larcker stated that this measurement can be used to measure the reliability of latent variable component scores and the results are more conservative than composite reliability. The recommended AVE value must be greater than 0.50, which means that 50% or more of the variance of the indicator can be explained (Hizam et al., 2022).

Table 2
Cronbach's alpha, composite reliability and AVE of the variables

	Cronbach's Alpha	rho A	Composite Reliability	Average Variance Extracted (AVE)
Communication Performance	0,972	0,972	0,982	0,947
Communication Proces	0,967	0,968	0,979	0,938
Media Capabilities	0,980	0,981	0,985	0,928
Media Selection	0,982	0,982	0,986	0,948
Moderating Effect 1	1,000	1,000	1,000	1,000
Task Performance	0,983	0,984	0,989	0,967

The Cronbach's Alpha value is used to evaluate the internal reliability of a measurement scale. The Cronbach's Alpha value obtained in the above data is 0.967 - 1.000, which indicates that all the scales used in the model have very good internal reliability. Rho_A is also used to evaluate the internal reliability of measurement scales. The Rho_A value in the data above is 0.972 - 1.000, which also shows that all the scales used in the model have very good internal reliability. Composite Reliability (CR) is also used to evaluate the internal reliability of measurement scales. The CR value in the above data is 0.979 - 0.989, which also shows that all the scales used in the model have very good internal reliability. Average Variance Extracted (AVE) is used to evaluate the construct validity of a measurement scale. The AVE value in the data above is 0.928 - 0.948, which indicates that all the scales used in the model have fairly good construct validity (Buitrago R et al., 2021).

Inner Model Test

Hypothesis Testing

Table 3
Path Coefficient Test

	Original Sample	Sample Mean	Std. Dev	T Statistics (|O/Std. Dev|)	P Values
Communication Proces-> Communication Performance	0,215	0,206	0,069	3,097	0,002
Communication Proces-> Task Performance	0,229	0,226	0,057	4,019	0,000
Media Capabilities-> Communication Performance	0,765	0,774	0,067	11,359	0,000
Media Capabilities->Task Performance	0,755	0,759	0,056	13,584	0,000
Media Selection-> Communication Proces	0,906	0,906	0,013	69,626	0,000
Media Selection->Media Capabilities	0,955	0,956	0,009	112,193	0,000
Moderating Effect 1-> Communication Performance	-0,051	-0,051	0,017	2,935	0,003

In the research conducted, there is a path that connects Communication Process to Communication Performance with a path coefficient of 0.215, a p value of 0.002, and a t count of 3.097.The path coefficient value of 0.215 indicates that every one unit increase in Communication Process will cause an increase of 0.215 units in Communication Performance. However, to determine whether the path coefficient is statistically significant, it is necessary to look at the calculated p value and t. The P value is the probability value to get the same or more extreme

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result if the null hypothesis is true. In this study, the p value of 0.002 indicates that there is a significant difference between Communication Process and Communication Performance, because the p value is less than 0.05 (a commonly used level of significance).

Furthermore, t count is a measure of how far the path coefficient value is from zero, in standard error units. The calculated t value of 3.097 indicates that the path coefficient value is greater than the zero value, because the calculated t value is greater than 1.96 (the t table value for a significance level of 0.05 and degrees of freedom is n-2). Thus, it can be it can be concluded that there is a significant relationship between Communication Process and Communication Performance, with every one unit increase in Communication Process will cause an increase of 0.215 units in Communication Performance. Communication Process and Communication Performance are two important concepts in the field of communication. Communication Process refers to the way the message is sent, received and understood by the recipient, while Communication Performance refers to how well the message is understood by the recipient and how effective the message is in achieving the goals desired by the sender of the message (Torro et al., 2022).

The results of regression tests performed on the relationship between the communication process and performance in a task. From the results of the regression test, it was found that there was a correlation coefficient of 0.229 and a p-value of 0.000 with a t count of 4.019. The correlation coefficient (r) is a measure of the strength and direction of the linear relationship between two variables. In this case, the correlation coefficient value of 0.229 indicates that there is a positive, albeit weak, relationship between the communication process and performance in a task. This means getting better communication process, the better the performance in a given task. In addition, a p-value of 0.000 was found. This p-value indicates the level of significance of the observed relationship. In this case, because the p-value is less than the specified alpha (level of significance), which is 0.05, it can be concluded that the relationship between the communication process and performance in the task is statistically significant.

Furthermore, there is a t count of 4.019. This value indicates how far the value of the correlation coefficient differs from zero, taking into account the sampling error. In this case, because the calculated t value is greater than t table at a significance level of 0.05 and certain degrees of freedom, it can be concluded that there is a statistically significant relationship between the communication process and performance in a task. Overall, the results of this regression test indicate that there is a positive and statistically significant relationship between the communication process and performance in a task. Therefore, it is necessary to pay attention to the importance of effective and efficient communication in improving communication performance in the performance of a given task. Several studies suggest that the higher the convergance parameter in the communication process dimension, the more likely it is to improve task performance.(Jong et al., 2021)

Discussion of the results of the regression test conducted on the relationship between media capability and communication performance. From the results of the regression test, it was found that there was a correlation coefficient of 0.765, a p-value of 0.000, and a t-count of 11.359. The correlation coefficient (r) is a measure of the strength and direction of the linear relationship between two variables. In this case, the correlation coefficient value of 0.765 indicates a positive and strong relationship between media capability and communication performance. This means that the better the media capability, the better the communication performance. In addition, a p-value of 0.000 was found. This p-value indicates the level of significance of the observed relationship. In this case, because the p-value is smaller than the specified alpha (level of significance), which is 0.05, it can be concluded that the relationship between media capability and communication performance is statistically significant.

Finally, there is a t count of 11.359. This value indicates how far the value of the correlation coefficient differs from zero, taking into account the sampling error. The greater the calculated t value, the greater our confidence that the observed correlation coefficient is not simply the result of chance. In this case, because the calculated t value is greater than t table at a significance level of 0.05 and certain degrees of freedom, it can be concluded that there is a statistically significant relationship between media capability and communication performance. Several studies have concluded that media that has speed in sending messages and contains variants of message symbols have the opportunity to produce message meanings according to the sender.(Thomas et al., 2023)

Overall, the results of this regression test indicate that there is a positive and statistically significant relationship between media capability and communication performance. Therefore, it is

necessary to pay attention to the importance of improving media capabilities in improving communication performance. Discussion of the results of the regression test conducted on the relationship between media capability and task performance. From the results of the regression test, it was found that there was a correlation coefficient of 0.755, a p-value of 0.000, and a t-count of 13.584. The correlation coefficient (r) is a measure of the strength and direction of the linear relationship between two variables. In this case, the value of the correlation coefficient is 0.755 indicates a positive and strong relationship between media capabilities and task performance. This means that the better the media capability, the better the task performance. In addition, a p-value of 0.000 was found. This p value indicates the level of significance of the observed relationship. In this case, because the p-value is smaller than the specified alpha (level of significance), which is 0.05, it can be concluded that the relationship between media capability and task performance is statistically significant.

Finally, there is a t count of 13.584. This value indicates how far the value of the correlation coefficient differs from zero, taking into account the sampling error. The greater the calculated t value, the greater our confidence that the observed correlation coefficient is not simply the result of chance. In this case, because the calculated t value is greater than t table at a significance level of 0.05 and certain degrees of freedom, it can be concluded that there is a statistically significant relationship between media capability and task performance. Overall, the results of this regression test indicate that there is a positive and statistically significant relationship between media capability and task performance. Therefore, it is necessary to pay attention to the importance of improving media capabilities in improving task performance(Damali et al., 2022).

In discussing the results of the regression test conducted on the relationship between media choices and the communication process. From the results of the regression test, it was found that there was a correlation coefficient of 0.906, a p-value of 0.000, and a t-count of 69.626. The correlation coefficient (r) is a measure of the strength and direction of the linear relationship between two variables. In this case, the correlation coefficient value of 0.906 indicates a positive and very strong relationship between the choice of media and the communication process. This means that the better the choice of media used, the better the communication process that occurs. In addition, a p-value of 0.000 was found. This p-value indicates the level of significance of the observed relationship. In this case, because the p-value is smaller than the specified alpha (level of significance), which is 0.05, it can be concluded that the relationship between choice of media and the communication process is statistically significant.

Finally, there is a t count of 69.626. This value indicates how far the value of the correlation coefficient differs from zero, taking into account the sampling error. The greater the calculated t value, the greater our confidence that the observed correlation coefficient is not simply the result of chance. In this case, because the calculated t value is very large, it can be concluded that there is a statistically significant relationship between the choice of media and the communication process.

Overall, the results of this regression test indicate that there is a positive and highly statistically significant relationship between media choices and communication processes. Therefore, it is important for organizations or individuals to consider properly in choosing the media that will be used to carry out the communication process so that the process can run well.

In this discussion, we will discuss the results of the regression test conducted on the relationship between media choice and media capability processes. From the results of the regression test, it was found that there was a correlation coefficient of 0.955, a p value of 0.000, and a t count of 112.193. The correlation coefficient (r) is a measure of the strength and direction of a linear relationship between two variables. In this case, the correlation coefficient value of 0.955 indicates a positive and very strong relationship between media choice and media capability processes. This means that the better the choice of media used, the better the media capability process will be. In addition, a p-value of 0.000 was found. This p-value indicates the level of significance of the observed relationship. In this case, because the p-value is smaller than the specified alpha (level of significance), which is 0.05, it can be concluded that the relationship between the choice of media and the process capability of the media is statistically significant.

Finally, there is a t count of 112.193. This value indicates how far the value of the correlation coefficient differs from zero, taking into account the sampling error. The greater the calculated t value, the greater our confidence that the observed correlation coefficient is not simply the result of chance. In this case, because the calculated t value is very large, it can be concluded that there is a statistically significant relationship between the choice of media and the capability of the media.

Overall, the results of this regression test indicate that there is a positive and very statistically significant relationship between the choice of media and the process of media capability. The results

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of the interviews show that the greater the opportunity for media access, the more often people use the media with a variety of applications.. Therefore, it is important for organizations or individuals to choose the right media in order to effectively enhance the media capability process (Torro et al., 2022).

In discussing the results of the regression test conducted on the relationship between the moderating effect and communication performance. From the results of the regression test, it was found that there was a correlation coefficient of -0.051, a p-value of 0.003, and a t-count of 2.935. The correlation coefficient (r) is a measure of the strength and direction of the linear relationship between two variables. In this case, the correlation coefficient value of -0.051 indicates that there is a weak negative relationship between the moderating effect and communication performance. This means that the greater the moderation effect, the communication performance will tend to decrease slightly. However, there are moderator variables that influence the relationship between the moderating effect and communication performance. Therefore, the moderating effect cannot be seen directly through the correlation coefficient. In this case, we need to check the p-value and t count. Found a p-value of 0.003. p value.

This value indicates the level of significance of the observed relationship. In this case, because the p-value is smaller than the set alpha (level of significance), which is 0.05, it can be concluded that the relationship between the moderating effect and communication performance is statistically significant.

In addition, there is a t count of 2.935. This value indicates how far the value of the correlation coefficient differs from zero, taking into account the sampling error. The greater the calculated t value, the greater our confidence that the observed correlation coefficient is not simply the result of chance. In this case, because the calculated t value exceeds 2.0, it can be concluded that the moderating effect does have an influence on communication performance.

Overall, the results of this regression test indicate that there is a negative and statistically significant relationship between the moderating effect and communication performance, but the effect is weak. In addition, it was found that there were moderator variables that influenced the relationship. Therefore, it is necessary to conduct further research to determine what factors influence this relationship.

Conclusions

The purpose of this research was to analyze the effect of media synchronicity on task performance and communication performance in rehabilitating rivers from domestic waste in the *Citarum Harum* program. The results showed that there was a significant relationship between communication process variables and communication performance, towards a significant relationship between media capabilities and communication performance, there was a significant relationship between media capabilities and task performance, there was a significant relationship between media choice and communication process, there was a relationship between media choice and media capability. But the relationship between communication process variables and task performance is weak and there is a negative relationship between the moderating effects on communication performance. So, that in further research it is necessary to develop models related to these sub-variables.

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