

# Comparison PAPI and CAPI methods in data collection : an application of technology acceptance model (TAM)

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## Abstract

This research aims to comparative analysis about technology acceptance model (TAM) variables; perceived usefulness (PU), perceived ease of use (PEOU), and attitude (ATT) of interviewers in using conventional paper and pencil interview (PAPI) and computer-assisted personal interview (CAPI) as data collection methods. The data were collected from two groups of interviewer, with a total of 334 interviewers. Analyses were conducted within each group and then compared using t-test using JASP 0.17.2.1. The findings showed that the two groups of PAPI and CAPI interviewers differed in their usage of survey methods. This research will assist organizations in planning the transformation of survey methods from PAPI to CAPI. It will also contribute to the understanding of the differences in interviewers' perceptions towards these two data collection methods.

**Keywords:** perceived usefulness, perceived ease of use, attitude, CAPI, PAPI

## I. INTRODUCTION

The digital era, computer-assisted personal interview (CAPI) method has become a popular alternative in survey data collection [1]. This method involves the use of technological devices such as computers, tablets, or smartphones to gather data from respondents. In contrast, the pencil and paper personal interview (PAPI) method is a traditional approach that involves using paper and pencils to fill out survey forms. With the numerous advantages it offers, eventually, most large-scale surveys will transition to CAPI, which provides various benefits [24]

The difference between CAPI and PAPI goes beyond the tools used and also involves the interviewers as data collectors [10]. The implications of this change, alongside the many benefits it brings, also present their own challenges [5], one of which is the attitude of the interviewers. The ability to adopt technology is a

manifestation of technological advancements [5]. Therefore, it is important to have a deeper understanding of these differences to maximize the benefits of both methods.

Although there have been numerous studies on PAPI and CAPI, there has been a lack of research comparing the technology acceptance between PAPI and CAPI from the interviewers' perspective. The focus of research has been on interviewers and respondents rather than the method transition. However, as organizations strive to modernize their data collection methods, it is crucial to evaluate and compare the effectiveness and acceptance of both approaches.

This study aims to examine and compare the perceptions and attitudes of interviewers toward the PAPI and CAPI methods. In this context, the Technology Acceptance Model (TAM) is used as an analytical framework. TAM is a theory that explores the factors influencing technology adoption and acceptance [11]. Specifically, this research will conduct a comparative analysis of TAM variables and interviewers' perceptions to understand the differences between the two. The interviewed interviewers come from two groups with experience in using both methods. It is hoped that this research will provide valuable insights for organizations in planning the transition from PAPI to CAPI.

## II. LITERATURE REVIEW

### A. Technology Acceptance Model (TAM)

Various types of information systems and communication technology research have used TAM [21]. The model assumes that the use of technology is influenced by two main variables, namely perceived usefulness and perceived ease of use [19]. This indicates that perceived usefulness and perceived ease of use have an impact on an individual's attitude towards technology adoption [2].

Perceived usefulness assumes that an individual's perception of using technology will enhance their job performance. On the other hand, perceived ease of use assumes that the easier the technology is to use, the more easily it will be accepted by users. Meanwhile, a positive attitude displayed by technology users enhances an individual's ability to adopt technology [11]. Several studies have demonstrated that TAM can be applied to predict technology acceptance in various domains such as healthcare [16], marketing [9], government [23], and others.

TAM provides a strong foundation for predicting and explaining technology acceptance, making it highly relevant for this research. The study focuses on three variables within TAM: perceived usefulness, perceived ease of use, and attitude.

### B. PAPI and CAPI Methods

Data collection methods can significantly influence the quality, accuracy, and efficiency of data collection. There are two commonly used methods: PAPI and CAPI. Despite the widespread use of CAPI, the PAPI method is still relevant and commonly employed. PAPI and CAPI methods continue to be prevalent in various surveys.



Fig 1. PAPI and CAPI methods [17][20]

The PAPI method involves a traditional approach where physical questionnaires or survey forms are distributed to respondents. Interviewers conduct face-to-face interviews, ask questions, and manually record responses on paper [4]. This method has been widely used for decades and offers advantages such as familiarity, ease of use, and perceived privacy for respondents [6].

The CAPI method utilizes technology to facilitate the data collection process. Interviewers use electronic devices such as tablets or laptops to administer surveys [22]. Questionnaires are presented digitally, and responses are directly entered into the device, eliminating the need for manual data entry [4]. In its implementation, CAPI still requires interviewers to read out questions and input respondents' answers [7]. This method offers various advantages such as real-time data validation, skip patterns, and automatic data storage and management [3].

### *C. Comparison Framework*

Comparative analysis can be conducted when there are two samples being compared [14]. This technique is used to examine similarities or differences between two or more groups [18]. The purpose of the comparison is to test hypotheses regarding the presence or absence of differences in the studied samples [14]. If there are differences, the results can be either significant or simply due to chance. In this study, a comparison is made between two independent samples. It is done to compare the group of PAPI users and the group of CAPI users.

Several studies have compared the CAPI and PAPI methods in the context of survey data collection. These comparisons have noted that the CAPI method yields shorter data collection times and higher response rates compared to the PAPI method [13]. Additionally, the CAPI method tends to result in lower error rates and better data quality [12]

In this study, a comparison can still be conducted to understand the differences and advantages of each method holistically. This research will contribute to existing studies by applying TAM factors such as perceived usefulness, perceived ease of use, and attitude in the context of using the CAPI and PAPI methods. Hypotheses are proposed based on this rationale as follows:

- H1. There is a difference in perceived usefulness between the PAPI and CAPI groups.
- H2. There is a difference in perceived ease of use between the PAPI and CAPI groups.
- H3. There is a difference in attitude between the PAPI and CAPI groups

## III. RESEARCH METHOD

### *A. Research Design*

This study employs a comparative design between two data collection methods, PAPI and CAPI. This design allows for a direct comparison between the two methods in terms of the observed variables, namely perceived usefulness (PU), perceived ease of use (PEOU), and attitude (ATT). PU is used to compare respondents' perceptions of the usefulness of PAPI and CAPI in survey data collection. PEOU is used to compare respondents' perceptions of the ease of use of PAPI and CAPI. ATT is used to compare respondents' attitudes towards PAPI and CAPI in the context of survey data collection

### *B. Participants*

The participants of this study are census enumerators from the Central Bureau of Statistics (BPS) in Lampung Province. They are divided into two independent groups, the PAPI group and the CAPI group. The total population of survey enumerators is 2,512 individuals. To determine the sample size, the SurveyMonkey calculator is used with a confidence level of 95% and a margin of error of 5%. A confidence level of 95% indicates that we have 95% confidence that the results from this sample represent the entire population. The 5% margin of error indicates the extent to which we can accept errors in generalizing the results from this sample to the population as a whole. The total sample for this study is 334 interviewers, with 167 in the PAPI group and 167 in the CAPI group. Participants are selected through random sampling, ensuring proportional representation from both groups.

### C. Instrument

The instrument used in this study was a questionnaire based on the Technology Acceptance Model (TAM) derived from previous research [8]. The measurement of constructs was done using a five-point Likert scale, ranging from 1 "strongly disagree" to 5 "strongly agree". The questionnaire consisted of three main sections, which included questions about perceived usefulness (PU), perceived ease of use (PEOU), and attitude (ATT), with a total of 15 questions. Additionally, demographic questions were included, such as gender, education, age, and experience. The questionnaire underwent validity and reliability testing prior to its use in this study.

### D. Data Collection Procedure

The data collection process is conducted by distributing the questionnaire to the interviewers from both groups online. The interviewers are provided with explanations of the research objectives and instructions for completing the questionnaire. Data is collected over a three-week period in June 2023. We ensure that the respondents are interviewers who were assigned to the 2022 Population Census.

### E. Data Analysis

The collected data will be analyzed using independent samples t-tests to compare the differences in perceived usefulness, perceived ease of use, and attitude between the PAPI and CAPI groups. The independent t-test is an appropriate method for comparing two different groups. Data analysis will be conducted using JASP 0.17.2.1 statistical software with a significance level of  $\alpha = 0.05$ .

### F. Ethics

This research has adhered to the principles of research ethics, ensuring data confidentiality and voluntary participation. Participants will be provided with clear information about the research objectives, data collection procedures, and their rights to not participate without any negative consequences. Data will be securely stored and used solely for the purposes of this research.

## IV. RESULTS AND DISCUSSION

### A. Result

#### 1) Responden profile

The characteristics of the respondents indicate a nearly balanced gender distribution, with 53.9% being male and 46.1% being female. Among the total respondents, 34.7% had a college degree, while 66.3% had a high school diploma. In terms of age, the sample was predominantly composed of individuals in the age range of 36 to 45 years (44%) and 26 to 35 years (31.7%), while the remaining respondents fell into the age ranges of 18 to 25 years (10.2%), 46 to 55 years (10.8%), and 56 to 62 years (3.3%).

#### 2) Reliability and validity analysis

Reliability testing is used to measure the extent to which the data collection instrument used in this study is consistent and reliable in measuring the observed variables. Reliability testing was conducted using the classical undimensional reliability analysis model. The results of the reliability test for all constructs yielded a Cronbach's alpha value of 0.899. Thus, it can be concluded that all constructs have good reliability because the Cronbach's alpha value should be  $>0.7$  [15].

Furthermore, to assess the validity, a confirmatory factor analysis was conducted using the average variance extracted (AVE) as the output. Convergent validity is determined by examining the average variance (AVE), which should be greater than 0.5. The validity test results showed that each construct had values  $> 0.05$ , ranging from 0.567 to 0.866.

#### 3) Hypotesis testing

Hypothesis testing was conducted using the independent samples T-test based on the classical model. According to Table 1, it was found that both PU, PEOU, and ATT have a significant influence between the PAPI and CAPI groups.

TABEL 1  
HASIL UJI T-TEST

| Independent Samples T-Test |              |           |     |        |
|----------------------------|--------------|-----------|-----|--------|
|                            | Test         | Statistic | df  | p      |
| PU                         | Student      | 5.395     | 332 | < .001 |
|                            | Mann-Whitney | 18952.000 |     | < .001 |
| PEOU                       | Student      | 2.877     | 332 | 0.004  |
|                            | Mann-Whitney | 16774.500 |     | 0.001  |
| ATT                        | Student      | 4.943     | 332 | < .001 |
|                            | Mann-Whitney | 17953.500 |     | < .001 |

H1. Difference in PU between the PAPI and CAPI groups. Data analysis revealed a significant difference in PU between the PAPI group ( $M = 23.635$ ,  $SD = 3.667$ ) and the CAPI group ( $M = 25.856$ ,  $SD = 3.856$ ),  $p < 0.05$ . These results indicate that interviewers in the CAPI group have significantly different PU compared to the PAPI group. Therefore,  $H_0$  is rejected, and  $H_1$  is accepted.

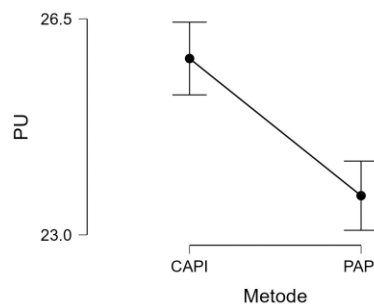


Fig 2. Descriptives plots PU

H2. Difference in PEOU between the PAPI and CAPI groups. Data analysis using independent samples t-test indicated a significant difference in perceived ease of use (PEOU) between the PAPI group ( $M = 27.431$ ,  $SD = 3.512$ ) and the CAPI group ( $M = 28.653$ ,  $SD = 4.217$ ),  $p < 0.05$ . These results suggest that interviewers in the CAPI group have significantly different PEOU compared to the PAPI group. Therefore,  $H_2$  is accepted.

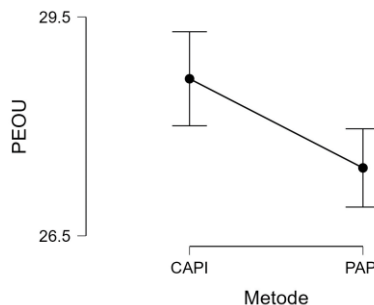


Fig 3. Descriptives plot PEOU

H3. Difference in ATT between the PAPI and CAPI groups. Data analysis revealed a significant difference in attitude (ATT) between the PAPI group ( $M = 7.593$ ,  $SD = 1.498$ ) and the CAPI group ( $M =$

8.335, SD = 7.593),  $p < 0.05$ . These findings indicate that interviewers in the CAPI group have significantly different ATT compared to the PAPI group in using the data collection method. Therefore, H3 is accepted.

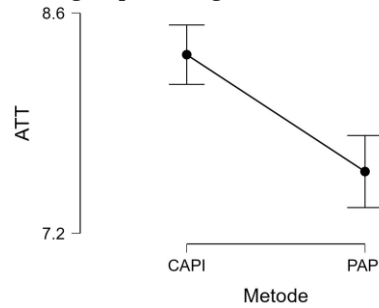


Fig 4. Descriptives plots ATT

## B. Discussion

The findings of this study are consistent with previous research that has demonstrated differences in the TAM factors as a model used to test technology acceptance. In this study, the differences in PU, PEOU, and ATT between the PAPI and CAPI groups indicate that the use of technology in data collection can significantly influence the perceptions and attitudes of interviewers.

One factor that can explain these differences is the technological features present in the CAPI method, such as ease of access, data processing speed, and flexibility in modifying survey questions. These features can enhance the perceived usefulness and ease of use of the CAPI method compared to the more traditional PAPI method.

Furthermore, the use of the CAPI method can also influence the attitudes of interviewers towards the data collection method. Factors such as confidence in using technology and comfort in adopting changes can affect interviewers' attitudes towards the CAPI method.

The findings of this study are limited to a sample consisting of interviewers. The perceptions and attitudes of interviewers may differ from respondents who answer surveys. Therefore, future research can involve respondents as research subjects to gain a more comprehensive understanding of the differences between the CAPI and PAPI methods.

Additionally, this research can also contribute to further research in expanding the understanding of technology acceptance and adoption in the context of data collection. Finally, practical recommendations from this study are that organizations wishing to adopt the CAPI method as a data collection method should consider the potential changes in interviewers' perceptions and attitudes. Adequate training and support in technology use can help reduce resistance to change and enhance more effective technology acceptance and adoption.

## V. Conclusion

Based on the research findings, there is a significant difference between two groups of interviewers in their perceptions towards the use of PAPI and CAPI data collection methods. This can be explained by the analysis of three TAM variables. Interviewers in the CAPI group have significantly different levels of PU, PEOU, and ATT compared to the PAPI group. These findings indicate that the use of the CAPI method in data collection has a significant influence on the perceived usefulness, perceived ease of use, and attitude of interviewers compared to the PAPI method. Understanding the differences between CAPI and PAPI methods in data collection will continue to evolve and provide better guidance for organizations in selecting methods that suit their needs, thereby ensuring the successful planning and implementation of the survey method transformation from PAPI to CAPI.

## ACKNOWLEDGMENT

We would like to express our gratitude to the team of academics at the Faculty of Communication, Universitas Padjadjaran, for their contribution to the success of this research. We thank our gratitude for our

colleagues in data collection, a lot of time would have been spent without your assistance. The respondents who participated in the survey and provided valuable responses. You have been instrumental in the success of this research.

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