Application of Protection Motivation Theory to Predict the Intention of Food Safety Behavior Among Food Handlers in the Culinary Area of Bantul Beach Tourism, Yogyakarta, Indonesia

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Abstract. Foodborne diseases are mostly caused by poor food safety behavior of food handlers. Bad behavior is formed in food handlers who believe that food safety is not an important thing to do. According to the Protection Motivation Theory (PMT), someone will take action if the more serious they feel the negative impact of a threat. Fear can motivate people to change their behavior and seek other forms of coping when they believe that they are threatened and that changing their behavior will make a difference to the outcome. This study aims to predict the behavioural intention of food safety using PMT. As many as 80 food handlers from all culinary stalls on beach tourism of Bantul, Yogyakarta, Indonesia, were interviewed face to face using a printed questionnaire regarding threats, coping, and intentions in food safety behavior. Data were evaluated using Structural Equation Model-Partial Least Square (SEM-PLS) Version 3.0. PMT can predict 64.8% of the variance of food safety behavioural intentions (R^2 adjusted = 0.648). Coping is the strongest predictor variable that has a significant positive effect on food safety behavioural intentions ($\beta = 0.508$, $p = 0.000 < 0.05$), followed by the threat variable which also has a significant positive effect ($\beta = 0.352$, $p = 0.000 < 0.05$).

Keywords: Bantul Indonesia · food handlers · intention · PMT

1 Introduction

Food security has a major impact on public health and the country's economy [1]. Millions of people get sick and die because of consuming unsafe food. One out of every 10 people in the world gets sick and every year 420,000 people die from eating unsafe food [2]. Unsafe food handling is the cause of most cases foodborne illness [3, 4]. Food safety behavior of food handlers is a major factor in controlling foodborne diseases [5, 6].

The Protection Motivatian Theory (PMT) states that an individual's behavior is closely related to his intentions. Intention is the subjective possibility of a person to perform an action or not. Through the intention will be illustrated how hard the individual

tries (intensity) and how much effort (magnitude) to display a behavior. Intentions in the form of motivation to protect oneself appear as a result of their assessment of the threat (threat appraisal) they face and their assessment of coping (coping appraisal) [7]. The assessment of the threat is based on the individual's belief in the vulnerability and the severity of the threat which will be detrimental if the behavior is not carried out, while the assessment of coping is based on the individual's belief that the threat will the effectiveness of the recommended behavior in eliminating or preventing possible harm (response efficacy) and belief in one's ability to carry it out (self-efficacy).

Previous researchers have proven that the PMT construct is very reliable in predicting intentions and behavior. Conley stated that perceived vulnerability, self-efficacy and response efficacy affect intentions for risk-reducing medication and breast MRI in women aged 40–69 in Washington [8]. Other research in China conducted concluded that response efficacy were positively related to COVID-19 vaccination intention [9]. Study conducted in Iran found significant positive correlations between the preventive behaviors of COVID-19 with the perceived vulnerability, perceived severity, response efficacy, self-efficacy, and protection motivation [10]. Ling stated that PMT successfully predicted 62% of the variance of intention to vaccinate influenza in America, while Ansari-Moghaddam found that PMT successfully predicted 61.5% of the variance of intentions for Covid-19 vaccination in Iran [11, 12].

Bantul Beach Yogyakarta has become a famous seafood processed culinary tourism destination and is recommended to visit. However, the results of previous research conducted by researchers showed that 40% of food handlers processed food unsafely [13]. Other researchers also reported that most of the existing culinary stalls do not have adequate facilities to process food in a healthy manner and the behavior of food handlers is not hygienic [14, 15].

Structural Equation Model (SEM) has been widely used in food safety analysis [16, 17]. With SEM analysis, it can be seen which latent variables affect the food safety behavioural intentions of food handlers, as well as provide a measure of the magnitude of the resulting effect. Thus, it can be seen what variables have the most influence on the behavioural intention of food safety. However, as far as the preliminary study that the researcher has done, no literature has been found that contains information related to the food safety behavioural intentions of food handlers in culinary tourism of the Bantul coast of Yogyakarta using the PMT theoretical approach and SEM analysis. This information will be useful for developing healthy food safety behavior and producing processed foods that are safe for consumption.

This study aims to measure the effect of latent variables consisting of threats and coping in food safety behavioural intentions of food handlers in the culinary tourism of Bantul beach, Yogyakarta. The alternative hypothesis is formulated and illustrated as shown in Fig. 1 based on the Protection Motivation Theory [7].

H1: Coping variable has a significant positive effect on the behavioural intention of food safety.

H2: Threat variable has a significant positive effect on the behavioural intention of food safety.
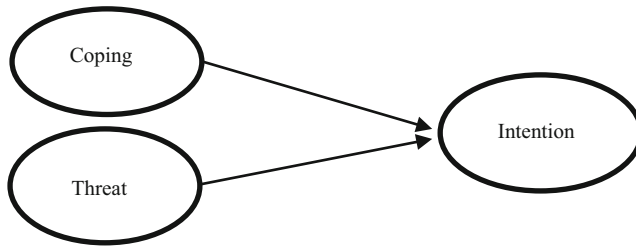
Fig. 1. The model development for constructing the relationship among coping, threat, and intention.

2 Methods

2.1 Research Design and Sampling Techniques

The study was carried out with a cross sectional design [18]. Data on exogenous variables (coping, threat) and endogenous variables (food safety behavioural intention) were collected at the same time. The population of culinary stalls on the coast of Bantul Yogyakarta is 80 stalls, each stall is represented by 1 food handler as a respondent, so the total food handlers who become respondents are 80 people [19].

2.2 Questionnaire Design

The questionnaire developed consisted of the respondent's characteristics, the threat, coping, and food safety behavioural intention. Characteristics of respondents contained data related to name, gender, age, education level, length of work, and location of the shop (beach). Coping variable is measured by response efficacy (7 statements) and self-efficacy (6 statements), threat variable is measured by vulnerability (9 statements) and severity (8 statements), and food safety behavioural intention variable is measured by intensity (8 statements) and magnitude (6 statements). The questionnaire consists of 44 statements using a 4-point Likert scale starting from point 1 (never/inadequate/impossible/not sure/not helpful/disagree/not dangerous) to point 4 (always/very adequate/very likely/very sure /very helpful/strongly agree/very dangerous). Questionnaire validation has been carried out at Kulonprogo beach tourism in Yogyakarta by involving 32 respondents. Based on the validity test, 2 invalid statements were obtained which were then issued, namely a statement on vulnerability and 1 statement on intensity. The results of the final analysis obtained 42 statements were valid (p value < 0.05) and reliable with Cronbach's Alpha value in each variable > 0.60 [20].

2.3 Data Collection

Data were collected by face-to-face interviews to evaluate the threat, coping, and food safety behavioural intentions. It takes between 30–45 min to interview each respondent. This research has received ethical approval from the Ahmad Dahlan University Research Ethics Committee 012010064 dated November 28, 2020.

2.4 Statistic Analysis

The validity and reliability of the instrument were evaluated by Measurement Model Evaluation using SEM analysis with SmartPLS 3.0 [21]. The influence relationship between threat, coping, and food safety behavioural intention was analyzed by Structural Model Analysis using SEM at a 95% confidence level, through Analysis of Feasibility Model (Goodness of Fit) and analysis of hypothesis testing.

3 Results

Information related to the characteristics of respondents in this study is briefly presented in Table 1.

3.1 Measurement Model Evaluation

The measurement model was evaluated through validity and reliability tests. The validity test is intended to evaluate the construct validity, whether the indicators used are appropriate in measuring latent variables, while the reliability tests are aimed at evaluating the reliability of the indicators, whether the statement items used as indicators have produced consistent respondents' answers. The results of the validity test that were

Table 1. Frequency Distribution of Respondents by The Gender, Age, Education, Length of Work and Beach Location.

Characteristics of Respondents	Amount	Percentage (%)
Man	0	0%
Woman	80	100%
Adult (25 years-45 years)*	54	67.50%
Elderly 46 years**	26	32.50%
Junior High School	45	56%
Senior High School	34	43%
Undergraduate/diploma	1	1%
Average Length of work (years)	9.9	
Parangtritis Beach	19	23.75%
Depok Beach	26	32.50%
Samas Beach	2	2.50%
Goa Cemara Beach	5	6.25%
Kuwaru Beach	6	7.50%
Baru Beach	22	27.50%

Information:* The youngest age is 25 years old.
** Oldest age 50 years old.

evaluated were Convergent Validity values, namely the Loading Factor and Average Variance Extracted (AVE) values, as well as the Discriminant Validity values, namely Cross Loading and Fornell-Larcker Criterion values. The evaluation results of the reliability test are indicated by the Composite Reliability and Cronbach's Alpha values.

The data in Table 2 below shows that the loading factor value of the manifest indicator of all variables is > 0.70 which is between 0.840 – 0.960, and the AVE value of all variables is > 0.50 which is between 0.788 – 0.909. Thus all indicators are convergent valid [22].

Table 3 shows that the value of the cross loadings of each manifest indicator of each variable is > 0.70 and is greater than the correlation to other latent variables. Likewise, the data in Table 4 shows that the Fornell-Larckel Criterion value is > 0.70 and is greater than the correlation to other latent variables. This proves that all of the manifest indicators analyzed are discriminant valid [22]. Furthermore, the data in Table 5 shows that all Cronbach's Alpha values > 0.70 are between 0.741 – 0.900 and Composite Reliability values > 0.70 which are between 0.881 – 0.952. It can be concluded that all indicators analyzed are reliable [23].

Table 2. Loading Factor and AVE value

	Threats	**Coping**	**Intention**
Severity	0.946		
Vulnerability	0.960		
Response Efficacy		0.922	
Self-Efficacy		0.861	
Intensity			0.933
Magnitude			0.840
AVE	0.909	0.795	0.788

Table 3. Cross Loadings Value

	Intention	**Coping**	**Threats**
Intention	0.933	0.790	0.791
Magnitude	0.840	0.560	0.475
Response Efficacy	0.777	0.922	0.810
Self-Efficacy	0.592	0.861	0.528
Severity	0.655	0.736	0.946
Vulnerability	0.754	0.730	0.960

Table 4. Fornell-Larcker Criterion Value

	Intention	**Coping**	**Threats**
Intention	0.888		
Coping	0.779	0.892	
Threats	0.743	0.769	0.953

Table 5. Cronbach's Alpha and Composite Reliability Values

	Cronbach's Alpha	**Composite Reliability**
Intention	0.741	0.881
Coping	0.746	0.886
Threats	0.900	0.952

3.2 Structural Model Analysis

The structural model describes the causal relationship between latent variables that has been built based on the theory. Threat and coping variables have a direct effect on the food safety behavioural intention variable (see Fig. 1 above). Structural Model Analysis is intended to determine the relationship between latent variables or between exogenous variables and endogenous variables. In this study, the predicted relationship is a direct relationship. The following structural model analysis will be explained through the model's feasibility analysis (Goodness of Fit Model) and hypothesis testing.

Model Feasibility Analysis (Goodness of Fit). The Feasibility Analysis of the Model is intended to determine the extent to which the model of the relationship between the variables that is compiled theoretically is supported by the facts that exist in the empirical data. Various indices were used to analyze the feasibility of the model as listed in Table 6 and Table 7. The data in Table 6 shows that the R square adjusted value is 0.648 with p value 0.000 < 0.05) which means that the variability of food safety behavioural intentions that can be explained by the model is 64.8%. Chin stated that the R Square value, was 0.67 as substantial (strong) and 0.33 as moderate [24]. Thus the R square value of 0.648 in this study is moderate and close to the substantial level (strong enough). This means that the structural model built is strong enough to predict food safety behavioural intentions. The value of Q square in Table 8 is 0.480 > 0.05 which means that the relevance of predicting threat and coping variables to food safety behavioural intentions is correct [24]. To validate the combined performance of the measurement model, and the overall structural model, Goodness of Fit (GoF) calculation value is used using the following formula:

$$GoF = \sqrt{AVE \times \overline{R^2}}$$
$$= \sqrt{0,831 \times 0,468}$$
$$= 0,734$$

GoF is said to be small if it has a value of 0.00 - 0.25, is said to be moderate if it has a value of 0.25–0.36, and is said to be large if it has a value of > 0.36. Thus the value of 0.734 is classified as a large GoF. It can be concluded that overall, the combined performance of the measurement model and the structural model hypothesized in this study has a good and acceptable fit with empirical data.

Hypothesis Testing Analysis. The analysis of hypothesis testing is carried out after the structural model that has been compiled theoretically is considered feasible, which means it is representative and is supported by the facts that exist in empirical data. The analysis of hypothesis testing in this study was carried out on the relationship between the variables studied as the structural model in Fig. 1 as well as the t-statistical value and p-value of the direct influence between latent variables contained in the path coefficient table resulting from the SmartPLS bootstrapping analysis which is presented in Table 8.

The path coefficients of the studied structural model as shown in Fig. 1 and the data in Table 8, show the strength of the direct relationship between variables. Among the two exogenous variables studied, the coping variable (H1) has the largest and significant coefficient ($\beta = 0.508$, $p = 0.000 < 0.05$), followed by the threat variable (H2) which is also significant ($\beta = 0.352$, $p = 0.000 < 0,05$). This means that the coping variable is the strongest predictor that has a positive effect on the food safety behavioural intentions

Table 6. The value of R Square adjusted

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Intention	0.648	0.647	0.070	9.260	0.000

Table 7. The value of Q Square (Construct Crossvalidated Redundancy/Blinfolding)

	SSO	SSE	Q^2 (=1-SSE/SSO)
Intention	160,000	83.143	0.480
Coping	160,000	160,000	
Threats	160,000	160,000	

Table 8. Summary of the results of the hypothesis testing, the direct influence of threat and coping variables on food safety behavioural intentions

Hypothesis	Paths	Original Sample (O)	T Statistics (|O/STDEV|)	P Values
H1	Coping - > Intention	0.508	6.172	0.000
H2	Threats - > Intention	0.352	4.006	0.000

of the food handlers, followed by the threat variable which also has a positive effect on the food safety behavioural intentions. Thus it can be concluded that H1 and H2 are acceptable.

4 Discussion

Food safety is a condition and effort to produce food with balanced nutritional content and safe from contamination by microorganisms and harmful chemicals that can cause disease [25, 26]. Food safety behavior is related to efforts to produce nutritionally balanced and safe food for consumption. The intention of food safety behavior is the subjective possibility of individuals to behave in food safety. Measuring the intention of food safety behavior means measuring the likelihood to behave in food safety. In this study, the possibility of food safety behavior from food handlers was measured through threat and coping constructs based on PMT theory.

The results of study as a whole prove that PMT successfully predicts the behavioural intention of food safety of food handlers in the culinary area of Bantul beach by 64.8% of the intention variance (Table 6). The value obtained is greater than the research results which states that PMT successfully predicts 40–48% of the variance of intentions to perform safe food handling behaviors [26]. As well as Phillip and Anita who uses another model which states that the Theory of Planned Behavior successfully predicts 48% of temporary intention viarians [27]. Chow and Mullan, stated that Health Action Process Approach accounted for 31% of the intention variance [28].

The results of the research as a whole conclude that the two hypotheses proposed are accepted. The first hypothesis (H1) is that the coping variable has a significant positive effect on the intention of food safety behavior is accepted with a value of $= 0.508$, $p = 0.000 < 0.05$, and the second hypothesis (H2) is that the threat variable has a significant positive effect on the food safety behavioural intention variable as well accepted with a value of $= 0.352$, $p = 0.000 < 0.05$. This means that the food handler's behavioural intention of food safety is influenced by the results of his assessment of coping and threat. The higher the results of the assessment of the coping and threat, the stronger the intention to behave in food safety.

Threat assessment has occurred in food handlers when they believe that unsafe food can cause serious problems (severity) and they are vulnerable (vulnerability) to the consequences. This assessment will stimulate their protection motivation so that food safety behavior will grow. If they also have a high level of assessment of coping, namely believing that the response efficacy will be effective in overcoming the threat (response efficacy) and they are able to do so (self-efficacy), then the intention to behave in food safety will be formed stronger.

In this study, it was found that the coping variable affected the intention more strongly than the threat. This is in line with research Norman et al. [29] which states that the intention to behave is related to the individual's belief that the recommended behavior will effectively reduce the threat and the belief that the individual is capable of performing the behavior. It can be said that the belief in self-efficacy to be able to behave in food safety is stronger than the fear of an adverse threat if the behavior is not carried out. The results of many previous studies also state that Perceived Behavioural Control (PBC),

a construct that is theoretically similar to self-efficacy, is the strongest predictor of intention in The Theory of Planned Behavior [30]. As an example, Bai et al., reported that PBC was the strongest predictor of food safety behavioural intentions of household food handlers in Mainland China [31]. As well as Mullan & Wong [32, 33] as well as Shapiro et al. [34]. Soon and Baines also stated that PBC was the strongest predictor of handwashing intention of farm workers [35].

However, the results of observations during field data collection showed that many of the existing culinary stalls did not have a freezer to properly store food ingredients. There were no closed cabinets that could ensure that the equipment and food ingredients stored were not contaminated with disease vectors, and even the kitchen floor was still covered with soil. So it looks dirty. In fact, food handlers feel confident that they can behave in food safety. According to the researcher's analysis, this happens because so far their culinary business has rarely been complained about or reported to cause illness. Besides that, the beach tourism area of Bantul is always visited by many tourists and their culinary business is still crowded with buyers.

Most of the clinical symptoms due to foodborne illness will appear some time or even a few days after consuming food. This means that symptoms of illness due to consuming unsafe food at tourist sites will be felt after they return and are in their place of origin. Not a few consumers do not realize that the illness they experience is due to the food consumed at tourist sites. Thus the incidence of illness experienced by tourists is not conveyed to the management of the culinary tourism business.

The results of the researchers' observations during field data collection also showed that consumers as tourists seemed to be satisfied with the existing conditions and were filled with pleasure in having the opportunity to eat and travel on the Bantul beach so that they ignored the food safety factor. This is related to the level of awareness of tourists who are still lacking in the importance of maintaining health by choosing safe places to eat. In this case, it is important to follow up in the form of socialization and education to tourists so that they have sufficient sensitivity and concern for food safety aspects of tourist culinary locations. If they consume unsafe-processed foods, it will endanger their health and even lead to death.

5   Conclusion

PMT succeeded in predicting 64.8% of the variance of food safety behavioural intention of food handlers in the culinary area of Bantul beach tourism. Coping variable is the strongest and significant predictor that has a positive effect on food safety behavioural intentions, followed by the threat variable which also has a significant positive effect. The results showed that efforts to improve food safety behavior of food handlers in the culinary area of Bantul beach tourism, Yogyakarta Indonesia, will be more effective if accompanied by the fulfillment of the facilities and infrastructure needed and the socialization of food safety to tourists as consumers.

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