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Analyzing the behavior toward Tempeh waste management at the home-scale industry level in Tempeh Village Sukomanunggal Surabaya

Hardian Eko Nurseto[1*], Muhammad Ainul Fahmi[2]

[1]Department of Anthropology, Faculty of Social and Political Science, Universitas Padjadjaran, Bandung, Indonesia
[2]Department of Business Administration, Faculty of Social and Political Science, Universitas Padjadjaran, Bandung, Indonesia

KEYWORDS

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Home industry
Tempeh waste generation
Waste management

ABSTRACT

Tempeh is a daily food, especially for Indonesians. Many people consume it as a source of protein for their staple food. However, people rarely know how Tempeh is produced in Indonesia. Most Tempeh is made by the home-scale industry, which still lacks in environmental awareness. Therefore, many Tempeh industries still directly dispose of their waste, causing environmental pollution in neighborhood areas. This study aimed to analyze the behaviors of the owners of the Tempeh industry concerning waste disposal or treatment. The respondents in this study were the owners of the home-scale Tempeh industry located in Tempeh Village Sukomanunggal Surabaya City. The collected data were processed using the structural equation model partial least square (SEM PLS) to determine the factors influencing the behavior toward waste disposal or waste treatment. The results showed various factors affecting the owners in disposing or treating waste from Tempeh production. These were Attitude Toward Behavior (ATB), Subjective Norm (SN), Perceived Behavioral Control (PBC), Environmental Awareness (EA), Government Intervention (GI), and Knowledge (KN), which affect the Intention to Manage Tempeh Waste Generation (IMTWP). The findings confirmed that the goal to treat Tempeh waste enhances the owners' behaviors to manage the disposal or treatment of the waste from Tempeh Village in Sukomanunggal - Surabaya.

Introduction

Tempeh is a typical food originating from Indonesia that the community has widely consumed as a primary source of protein for over 300 years (Shurtleff and Aoyagi, 2020). The Tempeh production is usually made using raw materials for various types of nuts and seeds (such as soybeans), then fermented using the help of fungi, namely *Rhizopus* sp. Tempeh contains significant amounts of protein, Vitamin B12, and bioactive compounds (Babu et al., 2009; Nout and Kiers, 2005; Ahnan-Winarno et al., 2021). According to previous research, Tempeh is mostly consumed as a nutritious and affordable food because Tempeh is cheaper than animal protein sources (Puspawati and Soesilo, 2018; Ahnan-Winarno et al., 2021).

Behind the benefits of Tempeh, unfortunately, the Tempeh industry will impact waste. Tempeh production needs much water to soak, peel, and boil soybeans. Consequently, it produces much wastewater (i.e., residual water from the soaking and boiling process) and solid waste (i.e., soybean husks) and. The soybean husks are usually used for animal feed. While, the wastewater is still discharged directly into the trench or nearby water bodies. The wastewater still contains high pollutants and not meet the national standard for discharge. Such practices lead to detrimental effects and pollution on surrounding environment (Puspawati and Soesilo, 2018).

In addition, untreated wastewater can emit odors and, if discharged directly into the river, will cause water pollution. According to a previous study, about 2 m^3 of wastewater is generated from 100 kg of soybeans. The wastewater contains suspended solids (SS) and dissolved solids (DS) which may lead to various environmental effects. First, these solids could undergo physical, chemical, and biological changes and bring out toxic substances, making a suitable area or condition for bacterial growth and disease-causing

*Corresponding author
E-mail address: hardian.e.nurseto@unpad.ac.id
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germs. Then, this will turn the wastewater's color to black color. This is followed by generating unpleasant odor, which may endanger respiration. Finally, if this wastewater adsorbed to the soils and goes through the underground water bodies, the water definitely can no longer be utilized. Furthermore, if the wastewater disposed of in the river, it could cause affect environment and human healths (i.e., causing diarrhea and other diseases) (Puspawati and Soesilo, 2018).

In addition, previous studies have also suggested that there have been many freshwater scarcity phenomena, and this research topic is one of the most challenging in global today. This problem can threaten water security, ecosystem health, and economic growth. Another challenge of adequate drinking water climate change and pressure on economic development and industrialization sectors ranging from home-scale industries to large corporations. The public and industrial sectors consume a high amount of fresh water, equal to their wastewater generation. If the wastewater is not managed properly (i.e., from the behaviors or awareness of owners/employees to treatment options), it leads to pollution with harmful impacts on aquatic ecosystems and community health (Tong and Elimelech, 2016; Abdelradi, 2018).

Therefore, this study aimed to analyze the behaviors of the Tempeh industry's owners concerning waste disposal or treatment in Tempeh Village in Sukomanunggal Surabaya City. The village currently has behavior problems in waste management due to lack in environmental awareness. This study is hoped to provide recommendations to better waste management, thus enabling to protect the surrounding environment from pollutions. Therefore, the home-scale Tempeh industries could survive despite facing many problems of risk of economic change and climate change.

Research Methods

The research was conducted in Tempeh Village Sukomanunggal, Surabaya City. The research used a case-study approach to formulate variables, dimensions, and indicators to solve existing problems. The formulation of variables in the behavior model was based on previous studies explained by Abdelradi (2018) ; Ariyani and Ririh (2020), with some modifications, as shown in Figure 1.

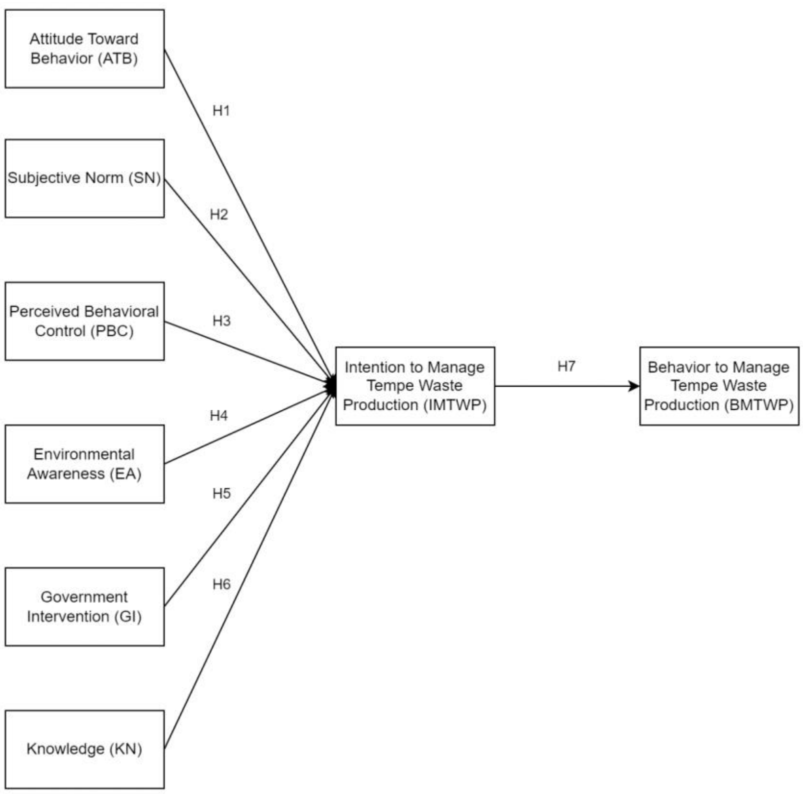

Figure 1. Model behavior to manage Tempeh waste

Based on Figure 1, the hypotheses were drawn as follows:

- H1: Attitude Toward Behavior (ATB) positively affects Intention to Manage Tempeh Waste Generation (IMTWP).
- H2: Subjective Norm (SN) positively affects IMTWP.
- H3: Perceived Behavioral Control (PBC) positively affects IMTWP.
- H4: Environmental Awareness (EA) positively affects IMTWP.
- H5: Government Intervention (GI) positively affects IMTWP.
- H6: Knowledge (KN) positively affects IMTWP.
- H7: IMTWP positively affects Behavior to Manage Tempeh Waste Generation (BMTWP).

These hypotheses suggest that the respective factors in the model (i.e., ATB, SN, PBC, EA, GI, and KN) positively influence the intention to manage Tempeh waste production (IMTWP). Additionally, IMTWP is expected to positively influence the behavior of managing Tempeh waste production (BMTWP). These hypotheses formed the basis for testing the relationships and determining the significance of the factors in the new synthetic model.

Data was collected through questionnaires to test hypotheses proposed from the code of determinants. Questionnaire operational variables should be coded in well-defined terms (see Appendix A: Supplementary Data). There are two stages of the questionnaire. In the first stage, the researchers describe the relationships between synthetic models of research proposals and measures used in individuals. The questionnaire uses a five-scale of Likert to score all items, with the following conditions, 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree (see Appendix A: Supplementary Data). There are seven main formative determinants, coded with Attitude Toward Behavior (ATB), Subjective Norm (SN), Perceived Behavioral Control (PBC), Environmental Awareness (EA), Government Intervention (GI), Knowledge (KN) and Manage Tempeh Waste Generation (IMTWP) formed and incorporated by researchers into the research model for the Behavior to Manage Tempeh Waste Generation (BMTWP) construct.

Next, in the second stage, an experiment was performed by distributing the questionnaires to all owners of the Tempeh home-scale industry using Google Forms. Purposive sampling with certain criteria was used based on the selection of samples. The sampling criteria were following Hair et al. (2021), who defined the minimum sample size based on the minimum R^2 value starting from 0.1, 0.25, 0.5, and 0.75 on endogenous constructs in structural equation model (SEM) for significance levels of 1%, 5%, and 10% by looking at the maximum number of constructions in the partial least square (PLS) Line Model. This research has seven independent variables in SEM size with a minimum R^2 of 0.75 and a significance level of 5%; therefore, the number of samples is at least 51.

Results and Discussion

Descriptive analysis

The outputs from the instrument analysis indicate that the respondents' perceptions are governed by their agreement to respond to the instruments stated (Table 1). That is proven by the highest index on the KN2 statement, "I know a lot about the food industry waste problem.", while the lowest index in the EA4 statement, "I believe that overgeneration of waste and improper disposal in landfills causes serious environmental problems."

Outer model

The measurement model signifies the power of manifest or observed variables as a representative of latent variables. Ghozali and Latan (2015) note that the loading factor value is ensured to have high validity when greater than 0.5. Table 2 presents each indicator for the results of the outer measurement model using SmartPLS 4.0. Table 2 shows that the score of outer loadings from all items exceeds 0.60, and the average variance extracted (AVE) was above 0.50. Thus, it can be inferred that they have met the outer loading test requirements and can be used to measure each latent variable.

Since there is no convergence validity problem, the next phase is Cross Loading to test the discriminant validity for each construct using correlation values between constructs in the model (Garson, 2016; Fahmi et al., 2023). The cross-loading method, as shown in Table 3, concludes that all measures are valid and free from discriminant validity problems. This was also proven by the transverse strain values for each intended structure being more significant than those for the other structures.

This research uses Cronbach's alpha and composite reliability scores to test the reliability of each latent structure. Furthermore, the rho_a value must be considered when using PLS design to confirm reliability (Dijkstra and Henseler, 2015; Fahmi, 2022b, 2022a). Table 4 shows that Cronbach's alpha and Composite Reliability coefficient values of all variables are higher than 0.70, and the rho_a value is greater than 0.70, indicating combined reliability. Therefore, based on the criteria from Hair et al. (2021), all the research variables have ideal validity and reliability.

Table 1. Descriptive analysis

Name	Mean	Standard deviation	Excess kurtosis	Skewness
ATB1	3.873	0.899	0.393	-0.704
ATB2	3.910	0.891	0.205	-0.669
ATB3	3.982	0.873	0.513	-0.738
ATB4	3.928	0.855	0.515	-0.662
ATB5	4.025	0.844	0.295	-0.672
ATB6	3.885	0.86	-0.087	-0.453
ATB7	4.060	0.849	0.101	-0.637
SN1	3.947	0.862	-0.258	-0.418
SN2	3.901	0.892	-0.233	-0.528
SN3	3.912	0.874	-0.667	-0.308
SN4	3.945	0.879	-0.18	-0.547
SN5	3.942	0.872	-0.119	-0.558
SN6	3.880	0.832	-0.150	-0.327
PBC1	3.901	0.879	-0.237	-0.439
PBC2	3.908	0.927	0.151	-0.67
PBC3	3.864	0.905	-0.449	-0.365
PBC4	3.921	0.916	0.078	-0.64
PBC5	3.945	0.879	-0.003	-0.588
PBC6	3.891	0.818	-0.029	-0.356
EA1	3.905	0.823	0.324	-0.497
EA2	3.993	0.847	0.7	-0.741
EA3	3.898	0.862	-0.008	-0.455
EA4	3.857	0.845	-0.002	-0.438
EA5	3.968	0.806	0.362	-0.551
EA6	3.963	0.864	0.082	-0.596
GI1	4.037	0.901	0.216	-0.758
GI2	3.924	0.884	0.76	-0.796
GI3	3.917	0.898	0.269	-0.681
GI4	3.908	0.927	0.151	-0.67
GI5	3.94	0.92	0.058	-0.649
GI6	3.988	0.872	0.074	-0.629
KN1	3.947	0.867	0.188	-0.6
KN2	4.067	0.888	0.124	-0.708
KN3	3.924	0.868	-0.239	-0.425
IMTWP1	3.977	0.878	-0.258	-0.53
IMTWP2	4.025	0.847	-0.419	-0.437
IMTWP3	4.007	0.858	-0.079	-0.585
IMTWP4	3.977	0.875	-0.142	-0.577
BMTWP1	3.949	0.834	-0.219	-0.36
BMTWP2	3.94	0.822	0.044	-0.439
BMTWP3	3.917	0.948	0.089	-0.666

Table 2. Convergent validity

Variable	Outer Loadings	AVE	Result
ATB1	0.743	0.662	Valid
ATB2	0.815		Valid
ATB3	0.862		Valid
ATB4	0.830		Valid
ATB5	0.835		Valid
ATB6	0.828		Valid
ATB7	0.778		Valid
SN1	0.796	0.712	Valid
SN2	0.883		Valid
SN3	0.868		Valid
SN4	0.874		Valid
SN5	0.884		Valid
SN6	0.748		Valid
PBC1	0.767	0.688	Valid
PBC3	0.823		Valid
PBC4	0.866		Valid
PBC5	0.869		Valid
PBC6	0.817		Valid
EA1	0.749	0.647	Valid
EA2	0.730		Valid
EA3	0.864		Valid
EA4	0.822		Valid
EA5	0.860		Valid
EA6	0.792		Valid
GI1	0.798	0.692	Valid
GI2	0.775		Valid
GI3	0.850		Valid
GI4	0.901		Valid
GI5	0.839		Valid
GI6	0.824		Valid
KN1	0.787	0.769	Valid
KN2	0.934		Valid
KN3	0.903		Valid
IMTWP1	0.888	0.771	Valid
IMTWP2	0.845		Valid
IMTWP3	0.894		Valid
IMTWP4	0.885		Valid
BMTWP1	0.933	0.768	Valid
BMTWP2	0.938		Valid
BMTWP3	0.744		Valid

Table 3. Discriminant validity

Indicator	TPB	BMTWP	EA	GI	IMTWP	KN	PBC	SN
ATB1	**0.743**	0.344	0.415	0.611	0.469	0.434	0.468	0.477
ATB2	**0.815**	0.458	0.506	0.687	0.583	0.539	0.601	0.633
ATB3	**0.862**	0.515	0.460	0.675	0.476	0.549	0.560	0.566
ATB4	**0.830**	0.507	0.501	0.685	0.490	0.542	0.622	0.609
ATB5	**0.835**	0.499	0.460	0.598	0.441	0.638	0.504	0.533
ATB6	**0.828**	0.480	0.481	0.611	0.507	0.656	0.554	0.608
ATB7	**0.778**	0.528	0.518	0.534	0.578	0.747	0.611	0.697
BMTWP1	0.531	**0.933**	0.630	0.577	0.603	0.568	0.689	0.638
BMTWP2	0.562	**0.938**	0.639	0.574	0.586	0.551	0.675	0.618
BMTWP3	0.447	**0.744**	0.470	0.425	0.397	0.448	0.463	0.405
EA1	0.507	0.474	**0.749**	0.564	0.525	0.475	0.579	0.554
EA2	0.516	0.581	**0.730**	0.470	0.479	0.433	0.545	0.511
EA3	0.473	0.551	**0.864**	0.667	0.612	0.594	0.622	0.589
EA4	0.390	0.499	**0.822**	0.594	0.576	0.578	0.583	0.567
EA5	0.499	0.601	**0.860**	0.636	0.590	0.634	0.574	0.558
EA6	0.482	0.528	**0.792**	0.694	0.621	0.635	0.584	0.552
GI1	0.548	0.490	0.699	**0.798**	0.611	0.612	0.584	0.583
GI2	0.599	0.441	0.563	**0.775**	0.491	0.553	0.423	0.431
GI3	0.623	0.526	0.673	**0.850**	0.600	0.637	0.522	0.528
GI4	0.694	0.514	0.649	**0.901**	0.560	0.681	0.557	0.545
GI5	0.735	0.555	0.572	**0.839**	0.599	0.657	0.576	0.580
GI6	0.660	0.487	0.612	**0.824**	0.614	0.776	0.574	0.588
IMTWP1	0.537	0.521	0.622	0.642	**0.888**	0.721	0.674	0.754
IMTWP2	0.527	0.550	0.617	0.594	**0.845**	0.720	0.692	0.743
IMTWP3	0.591	0.530	0.624	0.614	**0.894**	0.647	0.734	0.758
IMTWP4	0.557	0.554	0.627	0.608	**0.885**	0.651	0.726	0.771
KN1	0.676	0.522	0.616	0.758	0.544	**0.787**	0.518	0.537
KN2	0.652	0.544	0.624	0.695	0.702	**0.934**	0.625	0.696
KN3	0.606	0.520	0.615	0.653	0.778	**0.903**	0.674	0.741
PBC1	0.567	0.794	0.659	0.576	0.555	0.550	**0.767**	0.665
PBC3	0.541	0.510	0.607	0.550	0.745	0.641	**0.823**	0.805
PBC4	0.580	0.451	0.543	0.511	0.703	0.571	**0.866**	0.829
PBC5	0.613	0.466	0.582	0.522	0.724	0.588	**0.869**	0.867
PBC6	0.587	0.812	0.634	0.569	0.571	0.531	**0.817**	0.731
SN1	0.764	0.534	0.533	0.562	0.653	0.766	0.679	**0.796**
SN2	0.591	0.512	0.566	0.572	0.805	0.664	0.772	**0.883**
SN3	0.572	0.514	0.619	0.580	0.807	0.682	0.815	**0.868**
SN4	0.614	0.469	0.573	0.542	0.737	0.603	0.858	**0.874**
SN5	0.612	0.475	0.584	0.520	0.740	0.594	0.858	**0.884**
SN6	0.585	0.837	0.639	0.562	0.589	0.546	0.821	**0.748**

Table 4. Reliability test

Variable	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)
TPB	0.915	0.918	0.932
SN	0.918	0.926	0.937
PBC	0.887	0.896	0.917
EA	0.890	0.895	0.916
GI	0.911	0.913	0.931
KN	0.849	0.878	0.908
IMTWP	0.901	0.901	0.931
BMTWP	0.847	0.892	0.908

Table 5. Hypothesis analysis

Hypothesis	Original sample (O)	T statistics (|O/STDEV|)	P values
TPB -> IMTWP	0.226	3.734	0.000
SN -> IMTWP	0.858	10.199	0.000
PBC -> IMTWP	0.191	2.848	0.004
EA -> IMTWP	0.089	2.123	0.034
GI -> IMTWP	0.218	3.560	0.000
KN -> IMTWP	0.191	3.460	0.001
IMTWP -> BMTWP	0.614	17.939	0.000

Table 6. F-square analysis

Correlation	f-square	Effect Size
TPB -> IMTWP	0.079	Small
SN -> IMTWP	0.297	Medium
PBC -> IMTWP	0.017	Small
EA -> IMTWP	0.013	Small
GI -> IMTWP	0.054	Small
KN -> IMTWP	0.048	Small
IMTWP -> BMTWP	0.605	Large

Inner model

An overall model or inner model determines the causal relationship among the variables . Table 5 and Figure 2 present and reflect the analysis results .

This phase determines whether the research hypotheses proposed in the model are accepted or rejected. Path coefficients and t-statistics can be extracted by the bootstrap method and p-values to test the proposed hypothesis. According to Hair et al. (2014, 2017), path coefficient values range from -1 to +1, indicating a strong negative relationship to a strong positive relationship. At the same time, this study uses the t-statistic (bootstrap) to see the significant values between the constructs. Hair and Alamer (2022) suggested bootstrapping with a resample value of 5,000. The limits for rejecting and accepting the proposed hypothesis are ±1.96. The hypothesis is rejected if the t-statistic value is between -1.96 and 1.96. That is, the null hypothesis (H0) is accepted.

Figure 2, Tables 5, and Table 6 recapitulate the score among Attitude Toward Behavior (ATB), Subjective Norm (SN), Perceived Behavioral Control (PBC), Environmental Awareness (EA), Government Intervention (GI), and Knowledge (KN) with Intention to Manage Tempeh Waste Generation (IMTWP) of path coefficient values at 0.226, 0.858, 0.191, 0.089, 0.218, 0.191, and 0.614, near +1 values; the t-statistic value at 3.734, 10.199, 2.848, 2.123, 3.560, 3.460, and 17.939 (>1.96); f-square at 0.079, 0.297, 0.017, 0.013, 0.054, and 0.048; and p-value at 0.000, 0.000, 0.004, 0.034, 0.000, and 0.001 (<0.05), respectively.

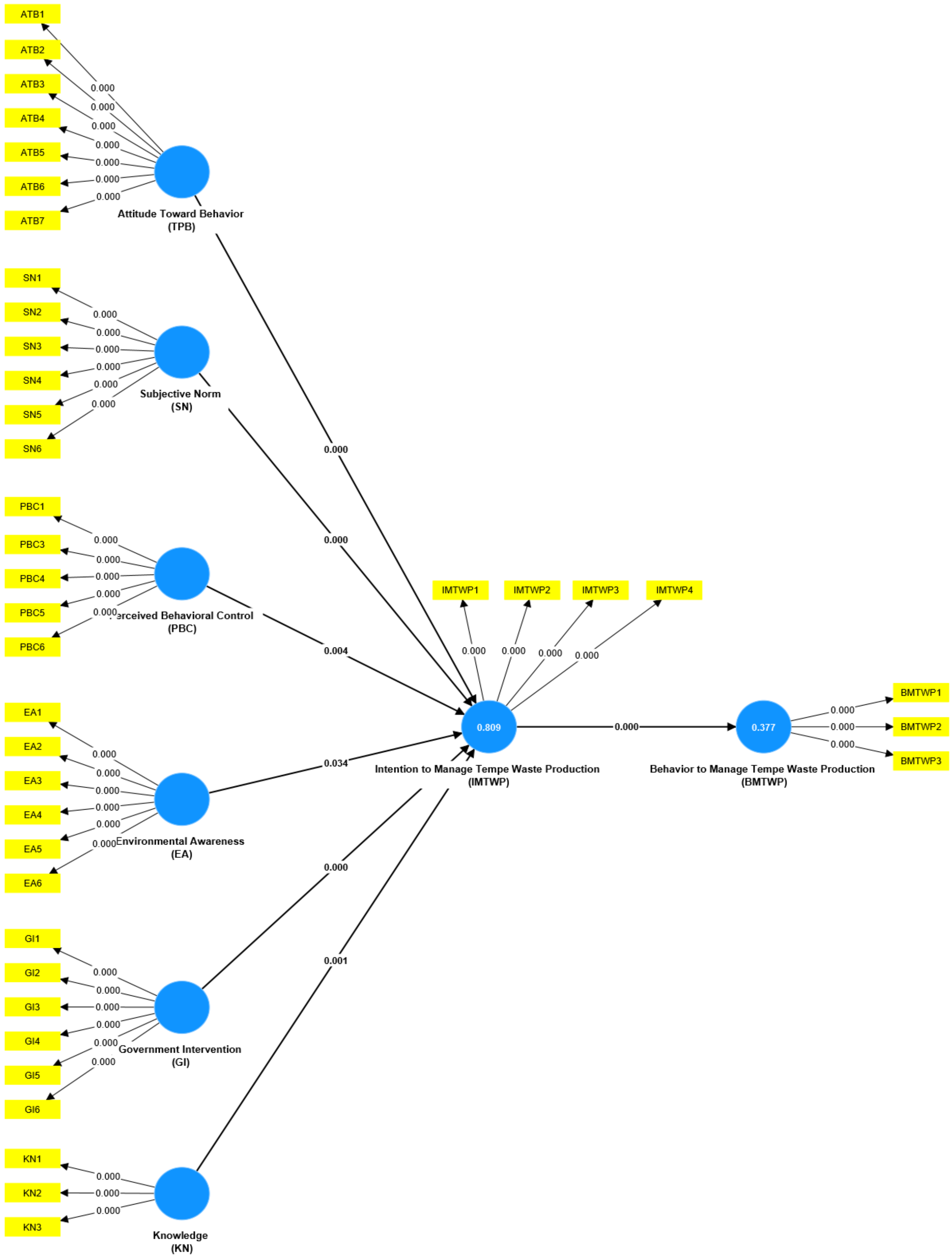

Figure 2. Bootstrapping test results; Source: Smart PLS 4.0 output results (2023)

Furthermore, Figures 2, Table 5, and 6 conclude that intention to manage Tempeh waste (IMTWP) has a positive and significant influence on the behavior to manage Tempeh waste (BMTWP). It is denoted by the results analysis between the two variables, with the path coefficient value of 0.614, which is near +1, t-statistics values of 17.939 (>1.96), f-square value of 0.605, and p-value of 0.000 (<0.05).

The statistical results indicate the following:

1. Attitude Toward Behavior (ATB): The t-statistic value of 3.734 indicates a significant and positive influence on IMTWP. The f-square value of 0.079 suggests that ATB explains about 7.9% of the variance in IMTWP. The p-value of 0.000 indicates statistical significance.
2. Subjective Norm (SN): The t-statistic value of 10.199 indicates a highly significant and positive influence on IMTWP. The f-square value of 0.297 suggests that SN explains about 29.7% of the variance in IMTWP. The p-value of 0.000 indicates statistical significance.
3. Perceived Behavioral Control (PBC): The t-statistic value of 2.848 indicates a significant and positive influence on IMTWP. The f-square value of 0.017 suggests that PBC explains about 1.7% of the variance in IMTWP. The p-value of 0.004 indicates statistical significance.
4. Environmental Awareness (EA): The t-Statistic value of 2.123 indicates a significant and positive influence on IMTWP. The f-square value of 0.013 suggests that EA explains about 1.3% of the variance in IMTWP. The p-value of 0.034 indicates statistical significance.
5. Government Intervention (GI): The t-statistic value of 3.560 indicates a significant and positive influence on IMTWP. The f-square value of 0.054 suggests that GI explains about 5.4% of the variance in IMTWP. The p-value of 0.000 indicates statistical significance.
6. Knowledge (KN): The t-statistic value of 3.460 indicates a significant and positive influence on IMTWP. The f-square value of 0.048 suggests that KN explains about 4.8% of the variance in IMTWP. The p-value of 0.001 indicates statistical significance.

Based on these results, all behavioral factors studied positively and significantly influence on IMTWP. Therefore, the hypotheses H1, H2, H3, H4, H5, and H6 are accepted.

The study’s results align with previous research (Ariyani and Ririh, 2020; Abdelradi, 2018). Both studies found a significant relationship between ATB and SN with IMTWP. Specifically, SN factors were found to have the greatest effect on improving behaviors related to Tempeh waste generation by increasing intentions to address food waste. This effect size is moderate, with an f-square value greater than 0.15. The influence of external social pressures, represented by SN factors, was more substantial in shaping individuals' intentions than internal pressures. This finding is consistent with a study by Ramayah et al. (2012) who reported that SN factors significantly influence in collectivist cultures, such as in Indonesia. PBC factor, which refers to individuals' beliefs about their ability to avoid Tempeh waste, was associated with a higher intention to avoid food waste. Several studies, have also identified perceived behavioral control as a significant predictor of intentions and behaviors related to waste reduction (Botetzagias et al., 2015; Strydom, 2018; Visschers et al., 2016). EA factors were found to significantly affect behavioral intentions (IMTWP), consistent with prior studies (Jereme et al., 2016; Ramayah et al., 2012). The findings suggest that formal or informal environmental training can strengthen intentions and behaviors for managing food waste. GI factor was found to play a significant role in influencing IMTWP. This finding contrasts with the study by Jereme et al. (2016), who emphasized the importance of government involvement in promoting environmentally responsible behavior. The divergence may be attributed to specific programs and regulations implemented by the Indonesian government targeting Tempeh waste production. Furthermore, increased knowledge about food waste issues is considered a relevant factor, as highlighted by Fusions (2023). Enhanced knowledge is expected to impact environmental awareness positively and subsequently influence intentions and behaviors related to waste management.

The study also examined the relationship between IMTWP and BMTWP. The statistical results indicate a significant and positive influence of IMTWP on BMTWP. Specifically, the t-statistic value of 17.939 (>1.96) suggests a highly significant and positive influence of IMTWP on BMTWP. The f-square value of 0.605 indicates that IMTWP explains about 60.5% of the variance in BMTWP. The p-value of 0.000 indicates statistical significance. These findings are consistent with the research conducted by Ariyani and Ririh (2020). They found that IMTWP significantly impacts BMTWP activities. Their study also reported that the motive to manage waste positively affects waste management behavior. The promotion of IMTWP encourages environmentally friendly behaviors related to Tempeh waste production. Therefore, the study's results support the seventh hypothesis (H7) that suggests a significant and positive relationship between IMTWP and BMTWP regarding waste management behaviors in Tempeh Village Sukomanunggal Surabaya.

Conclusion

This study concluded that all behavioral factors (i.e., Attitude Toward Behavior/ATB, Subjective Norm/SN, Perceived Behavioral Control/PBC, Environmental Awareness/EA, Government Intervention/GI, and Knowledge/KN) positively affect the Intention to Manage Tempeh Waste Generation (IMTWP) in the Tempeh home-scale industry in Tempeh Village Sukomanunggal Surabaya. These experimental findings confirm the conceptual research model. The IMTWP strongly impact the Behavior to Manage Tempeh Waste Generation (BMTWP), indicating that intentions to manage waste translate into actual behaviors. The factors influencing IMTWP are significant determinants and driver to increase BMTWP. This suggests that addressing factors (such as attitude, social norms, perceived control, environmental awareness, government intervention, and knowledge) can promote and improve waste management behaviors. Overall, the study highlights the importance of understanding and addressing the determinants of waste management behavior in Tempeh industries. By targeting factors influencing intentions and behaviors, efforts should made to encourage sustainable waste management practices and reduce the environmental impact of Tempeh waste generation in Tempeh Village Sukomanunggal Surabaya.

Declarations

Conflict of interests The authors declare no competing interests.

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