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Hygiene Behavior of Students Based on Knowledge and Habit Formation

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Abstract: The objective of the study is to describe hygiene behavior of vocational school students majoring in culinary in Malang, Indonesia (n = 414). The described behavior is related to student's knowledge and habit formation teachers introduced in order to apply the principles of food hygiene during food processing class. The findings showed that most of the students (65.5%) had good knowledge on hygiene and 1.4% of them had very good knowledge on hygiene. 51.0% of the teachers developed student's habit formation to apply food hygiene principles frequently and 41.8% of them always developed the student's habit formation to apply the food hygiene principles. During the class, 9.7% of the students had good hygiene behavior while 90.3% of them had very good hygiene behavior. The path coefficient of knowledge towards hygiene behavior was 0.056, that of the habit formation the teachers introduced was 0.938. The direct influence of knowledge towards hygiene behavior was (3.766), and habit formation towards hygiene behavior was (62.811), while the indirect influence of knowledge towards hygiene behavior through habit formation the teachers introduced was (2.965). In conclusion, higher knowledge followed by more frequent habit formation by the teachers would result in increasing hygiene behavior.

Keywords: hygiene behavior, knowledge, habit formation, food processing class, vocational school students

I. INTRODUCTION

Spread of disease through food has been going on for years. One of the reasons is that food people consume has yet met the food safety requirement. Food handlers are responsible for and play significant role in food security within the entire production chain. Readily consumed food refers to some food without any chemical, biological or physical contamination. Therefore, food handlers should pay careful attention towards food safety through implementation of the food hygiene principles during food processing activities. Hygiene is primary and pivotal aspect for food handlers because they directly touch the food and thus, are responsible for the safety of the food being produced.

Vocational school students majoring in culinary are students trained for working in culinary business as middle-range workforce. In other words, vocational school graduates are going to be responsible for food processing or being food handlers who get involved in food production directly.They should have sufficient knowledge and develop habit related to food hygiene and food sanitation principles, so that they would apply the principles while processing and serving food. Andrej Ovca, Mojca Jev_Snik, and Peter Raspor (2014) revealed that lack of knowledge increases risk for cross-contamination, unsafe preservation of food scraps and re-heating.In conclusion, developing hygiene behavior of the students requires not only knowledge but also habit formation.

The principles of food hygiene involve sorting ingredients, processing, storing food, transporting, serving and personal hygiene. Introduction towards the principles of food hygiene takes place when the vocational school students attend "Sanitasi, Higiene, dan Keselamatan Kerja" class, class on sanitation, hygiene and safety at work, in their 1st and 2nd semester. It is expected that they apply knowledge they obtain during the class in food processing class. In order to make sure that the students apply their knowledge on food hygiene in the food processing class, it isimportant for teachers to develop the student's habit. Teachers should establish certain Standard Operating Procedure (SOP) for food hygiene principles. All students are supposed to meet the requirements of the SOP, followed by some reinforcement (rewards or punishment) and more importantly, examples by the teachers.

II. METHODOLOGY

2.1 Research Design

The study was categorized as ex-post facto explanatory research.The population was vocational school students majoring in culinary in Malang, Indonesia.The subjects were 11th grade (3rd semester) students because they had attended "Sanitasi, Higiene, dan Keselamatan Kerja", sanitation, hygiene and safety at work class, in their 1st and 2nd semester. The total respondents were 414students from 10 vocational schools that have culinary concentration in Malang. The schools were located in Malang municipality, the city of Batu and Malang). The schools located in the Municipality of Malang were SMK Negeri 1 Turen, SMK Negeri 1 Gedangan, SMK Muhammadiyah Singosari, and SMK Hidayatul Mubtadi'in. SMK Negeri 1 Batu was located in the city of Batu, while SMK Negeri 2, SMK Negeri 3, SMK Negeri 7, SMK Kartika, and SMK Cor Jesu were located in the city of Malang.

The data collection took place during the even semester of the 2016/2017 academic year.The data collection consisted of three stages, test, questionnaire and observation.The instruments were testingbooklet, set of questionnaire and observation guide. The data collection procedure was as follow: the first was asking the respondents to sit on a test at the end of the lesson. The test consisted of multiple choice items related to the food hygiene principles i.e., personal hygiene, sorting for ingredients, storing ingredients, food processing, storing processed food, transporting and serving. The purpose of the test was to describe the respondents' knowledge on the principles of food hygiene that would later be related to hygiene behavior during food processing class. The second was distributing questionnaire. The questionnaire consisted of questions that evaluate how the teachers developed the students' habit formation to apply the principles of food hygiene during food processing class. The third was observation of which purpose was to describe the students' hygiene behavior in food processing class. The observation involved any behavior indication the implementation of the food hygiene principles starting from personal hygiene, storing ingredients, processing, storing processed food, transporting and serving.

2.2 Instrument

The instruments were designed and developed by the researchers. They consisted of test that measured knowledge, questionnaire that measured habit formation introduced by the teachers and check list that measured the students' behavior. The knowledge, habit formation developed by the teachers and students' behavior involved knowledge about and implementation of the food hygiene principlesi.e., personal hygiene, sorting for ingredients, storing ingredients, food processing, storing processed food, transporting and serving.

2.3 Data Analysis

SPSS 20.0 was the software used for data analysis. Path analysis was conducted to describe the influence between the variables (the influence of knowledge and habit formation by the teachers towards the students' hygiene behavior).The analysis was used because the study explained the mechanism of causal influence between the variables by explaining correlation coefficient into both direct and indirect influence.

III. FINDINGS

Based on the test, questionnaire and observations, the findings of the study were as follow:

3.1 Knowledge

Table1. The Respondents' Knowledge

No	Category	Criteria	Frequency	Percentage (%)
1	Poor	0 – 10	8	1.9%
2	Fair	11 – 21	129	31.2%
3	Good	22 – 32	271	65.5%
4	Very Good	33 - 43	6	1.4%
Total			414	100%

Table 1, the result of analysis towards the respondents' knowledge related to the food hygiene principles, showed that 271 respondents (65.5%) had good knowledge on the food hygiene principles, 129 respondents (31.2%) had fair knowledge on the topic, 8 respondents (1.9%) had poor knowledge on the topic and 6 respondents (1.4%) had very good knowledge on the food hygiene principles. As a conclusion, the average knowledge level of the respondents on the topic was good.

Table 2 elaborated the respondents' knowledge on the food hygiene principles into several indicators. The indicators were as follow:

Table 2. Respondents' Knowledge for Each of the Hygiene Principles

No	Indicator	F	%
1.	Personal hygiene	217	52.4
2.	Sorting for Ingredients	46	11.1
3.	Storing for Ingredients	8	1.9
4.	Food Processing	8	1.9
5.	Processed Food Storing	22	5.4
6.	Transporting	93	22.5
7.	Serving	20	4.8
	Total	414	100

Based on Table 2, most of the respondents (52.4%) had knowledge on personal hygiene. 11.1% of the respondents had knowledge on sorting for ingredients, 1.9% of them had knowledge on storing for ingredients, 1.9% of them had knowledge on processing, 5.4% of the respondents had knowledge on processed food storing, 22.5% of the respondents had knowledge on food transporting and 4.8% had knowledge on serving.

3.2 Habit Formation

Table3. Habit Formation by the Teachers

No	Category	Criteria	Frequency	Percentage (%)
1	Never	27 – 47	0	0%
2	Sometimes	48 – 68	30	7.2%
3	Frequently	69 – 89	211	51.0%
4	Always	90 – 110	173	41.8%
Total			414	100%

Table3showed that 211 respondents (51%) stated that the teachers developed their habit related to the food safety principles frequently, 173 respondents (41.8%) stated that the teachers always developed their habit related to the food safety principles and 30 of them (7.2%) stated that the teachers sometimes developed their habit related to the food safety principles. In conclusion, most of the teachers frequently developed the students' habit related to the food safety principles.

Table 4 described the teachers' effort in developing the students' habit in the food hygiene principles:

Table 4. Indicator of Habit Formation by the Teachers

No	Indicator	F	%
1.	Repetition	62	15.0%
2.	Reinforcement	180	43.5%
3.	Teachers' Example	172	41.5%
	Total	414	100.0%

Table 4 showed that 15.0% of the respondents stated that the teachers developed their food safety habit through repetition, 43.5% of the respondents stated that the teachers developed the habit through reinforcement and 41.5% of them stated the teacher did so by setting up examples.In other words, repetition was the least frequent method the teachers used to develop the students' habit in the food safety principles.

3.3 Hygiene Behavior

Table5. Hygiene Behavior

No	Category	Criteria	Frequency	Percentage (%)
1	Poor	33 – 57	0	0%
2	Fair	58 – 82	0	0%
3	Good	83 – 107	40	9.7%
4	Very Good	108 – 132	374	90.3%
Total			414	100%

Table5showed that 374 respondents (90.3%) had very good hygiene behavior and 40 respondents (9.7%) had good hygiene behavior. Hence, the average hygiene behavior of the students was very good.

Table 6 showed the most prominent indicators of hygiene behavior the students had. They were as follow:

Table 6. Prominent Behavior

No	Indicator	F	%
1	Personal hygiene	187	45.20
2	Sorting for Ingredients	104	25.10
3	Storing for Ingredients	50	12.10
4	Food Processing	10	2.40
5	Processed Food Storing	23	5.60
6	Transporting	28	6.80
7	Serving	12	2.90
	Total	414	100

Based on Table 6, the most prominent behavior or the behavior the respondents carried out well was personal hygiene. 45.2% of the respondents showed good behavior in personal hygiene. Other prominent indicators for the hygiene behavior were sorting for ingredients (25.1%), storing of ingredients (12.1%), food processing (2.4%), processed food storing (5.6%), transporting processed food (6.8%), and serving (2.9%).

3.4 Influence between Variables and Path Coefficient

Table 7. Influence between Variables

Influence	**Path Coefficient**	**t-statistic**	**Sig.**	**R^2**
X1 → Y1	0.356	7.740	0.000	12.7%
Total				12.7%
X1 → Y2	0.056	3.766	0.000	5.2%
Y1 → Y2	0.938	62.811	0.000	86.8%
Total				92%

Description: X1 = Knowledge, Y1 = Habit Formation by the Teachers, Y2 = Hygiene Behavior

3.4.1 Influence of Knowledge towards Habit Formation by the Teachers

The path coefficient being developed between knowledge and habit formation by the teachers was as follow:

$$Y1 = 0.356\ X1 + e1$$

The path coefficient of knowledge towards habit formation by teachers was 0.356 which meant that 1 point increase in knowledge would result in 0.356 point increase in habit formation by the teachers. The contribution of knowledge towards habit formation by the teachers was 12.7% meaning that 12.7% change in the habit formation was the result of change of knowledge.

3.4.2 Influence of Knowledge towards Hygiene Behavior

The path coefficient was:

$$Y2 = 0.056\ X1 + 0.938\ Y1 + e2$$

The path coefficient of knowledge towards hygiene behavior was 0.056 that meant 1 point increase in knowledge would result in 0.056 increase in hygiene behavior. The contribution of knowledge towards hygiene behavior was 5.2% meaning that 5.2% change in hygiene behavior was the result of change of knowledge.

3.4.3 Influence of Habit Formation towards Hygiene Behavior

The path coefficient of habit formation by the teachers towards hygiene behavior was 0.938 which meant 1 point increase in habit formation by the teachers would result in 0.938 increase in hygiene behavior. The contribution of the habit formation towards hygiene behavior was 86.8% which meant 86.8% change in hygiene behavior was the result of change of the habit formation by the teachers.

Total determination coefficient explained how high or low the path model being developed to explain the data was. The determination coefficient was between 0% and 100%, in which the higher determinant coefficient was, the better the model was in explaining the data.

$R_m^2 = 1 – [(1 – 0.127) \times (1 – 0.920)] = 0.930$

Based on the analysis towards the path model, the total determination coefficient was 0.930 meaning that the model was able to describe 93% of the data used in the study.

3.5 Hypothesis Testing

Based on the analysis, there were 3 direct influences and one indirect influence in the context of the study. The analyses were as follow:

3.5.1 Direct Influence

Table 8. Direct Influence

Influence	Path Coefficient	Standard Error	t-statistics	Sig.
X1 → Y1	0.356	0.120	7.740	0.000
X1 → Y2	0.056	0.023	3.766	0.000
Y1 → Y2	0.938	0.009	62.811	0.000

Description: X1 = Knowledge,
Y1 = Habit Formation by the Teachers,
Y2 = Hygiene Behavior

3.5.1.1 Direct Influence of Knowledge towards Habit Formation by the Teachers

The t-statistics of the direct influence of knowledge towards habit formation was (7.740); it was higher than the t-table (2.002) or p-value (0.000) and lower than alpha 5% (0.050). Therefore, knowledge had positive and significant influence towards the habit formation by the teachers.Higher knowledge would result in increasing habit formation by the teachers and, at the opposite, lower knowledge would result in decreasing habit formation by the teachers.

3.5.1.2 Direct Influence of Knowledge towards Hygiene Behavior

The t-statistics of the direct influence of knowledge towards hygiene behavior was (3.766); it was higher than the t-table (2.002) or p-value (0.000) or alpha 5% (0.050). In conclusion, knowledge had positive and significant influence towards hygiene behavior.Higher knowledge would result in increasing hygiene behavior and, at the opposite, lower knowledge would result in decreasing hygiene behavior.

3.5.1.3 Direct Influence of Habit Formation by the Teachers towards Hygiene Behavior

The t-statistics of habit formation by the teachers towards hygiene behavior was (62.811); it was higher than the t-table (2.002) or p-value (0.000) and higher than alpha 5% (0.050). As a conclusion, habit formation by the teachers had positive, significant influence towards hygiene behavior. Higher habit formation by the teachers would result in increasing hygiene behavior and, at the opposite, lower habit formation by the teachers would result in decreasing hygiene behavior.

3.5.2 Indirect Influence

Table9. Indirect Influence

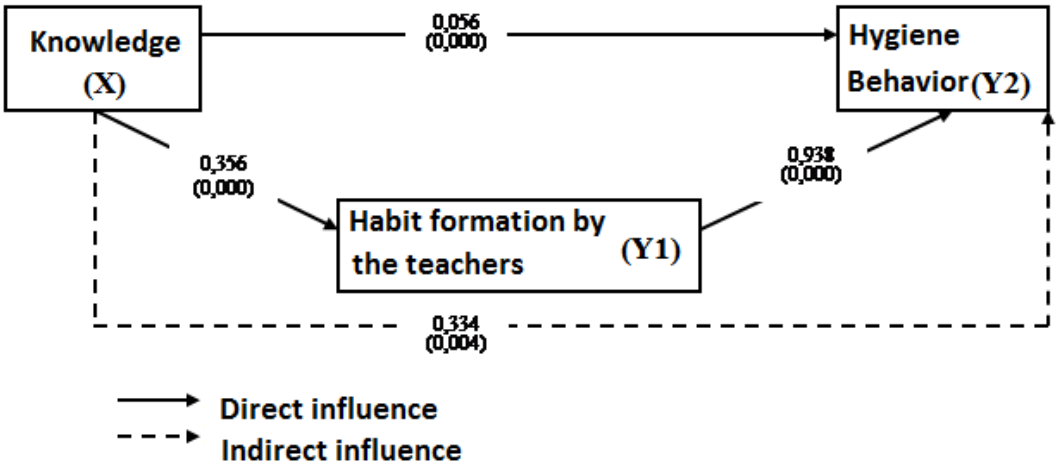
Influence	Path Coefficient	Standard Error	t-statistics	Sig.
Indirect influence of knowledge towards hygiene behavior through habit formation by the teachers	0.356 x 0.938 = 0.334	$(0.356^2 \times 0.009^2) + (0.938^2 \times 0.120^2)$ = 0.113	0.334 / 0.113 = 2.965	0.003

Description: X1 = Knowledge,
Y1 = Habit Formation by the Teachers,
Y2 = Hygiene Behavior

The t-statistic (2.965) was higher than the t-table (2.002) or the level of significance (0.003) was smaller than the alpha 5% (0.050). Thus, knowledge had indirect, significant and positive influence towardshygiene behavior through the habit formation by the teachers. It meant higher level of knowledge followed by more frequent habit formation by the teachers would result in increasing hygiene behavior. At the opposite, lower knowledge followed by less frequent habit formation by the teachers would result in decreasing hygiene behavior.

The following Figure 1 described the path analysis conducted towards the variables.

Figure 1. Path Coefficient Diagram



IV. DISCUSSION

Previous studies related to knowledge, attitude and practice of hygiene of street food hawkers and food handlers working in restaurants, hospitals and education institutes have been conducted frequently (Mohd Onn Rashdi Abd Patah, et al., 2009; Bas, M., Ersun, A.S., et al., 2006;George Amponsah Annor, et al., 2011;Anuradha, and R.H. Dandekar, 2014; Angelillo, I. F., et.al., 2000). In general, the observed hygiene practice referred to personal hygiene and how to wash hands. The study analyzed knowledge and hygiene behavior of vocational school students majoring in culinary as food handlers during food processing class. The difference between the study and the previous studies was, among others, knowledge and behavior observed in the study was behavior in applying the food hygiene principles in food processing. Furthermore, the researchers made correlation between the knowledge as well as the attitude and the habit formation by the teachers. The following section was devoted for discussions related to the findings of the study.

4.1 Food Hygiene Knowledge

The findings showed that most of the respondents (65.5%) have good level of knowledge related to food hygiene and food sanitation while 1.4% of them have very good level of knowledge about the topic. "Sanitasi, Higiene, dan Keselamatan Kerja" class the respondents took in their 1st and 2nd semester contributes to that.Accorrding to Anderson, L.W., and Krathwohl, D.R. (2001), knowledge is the lowest yet the most fundamental cognitive aspect. It means, Artinya, knowledge allows an individual to recall an object, concept, method and process or pattern, structure and setting. Sanitation and hygiene concept being introduced to the students in their 1st and 2nd semester aims at introducing hygiene behavior during food processing class.Knowledge an individual has, one derived from education, training or experience, has positive contribution towards carefulness. It is in line with Notoatmodjo (2003) that education is a basis or foundation for an individual to take positive action. Knowledge allows a person to carry out correct and suitable action. In other words, individual behavior is related to his or her knowledge, including hygiene behavior in food processing practice. On the other hand, the finding of Suci Fatmawati, Ali Rosidi, and Erma Handarsari (2013)'s study reveals that education does not play significant role in food hygiene and sanitation because there is another aspect contributing to behavior, which is habit formation.

4.2 Habit Formation

Habit formation may refer to repeated learning process carried out by an individual or a group, conducted based on or without schedule and conducted inside or outside the classroom. The purpose is to develop permanent and automatic attitude and behavior which in turn results in competence. At school, habit formation is composed of routine, spontaneous, scheduled activities and examples.Its general purpose is to develop student's discipline, politeness, honesty, agility and set up some examples.

One method the teacher conducted to develop the respondents' hygiene behavior is developing habit formation to apply the hygiene principles during food processing class. The principles involve personal hygiene, sorting for ingredients, sorting of ingredients, food processing, processed food storing and serving. The students develop their habit under the teachers' supervision every time the food processing class is in session.The

objective is integration between the hygiene behavior and the students' characteristics as well as to create qualified graduates.

4.3 Hygiene Behavior

Hygiene behavior refers to type of behavior food handlers have in processing food. Such behavior is related to food sanitation or all condition and measures needed to make sure food is safe and edible at the entire food processing chain.Susan, W. Arendt, Paola Paez, and Catherine Strohbehn(2013) mentioned that the main priority of service for customer is to make sure the food being served is safe for consumption. When it is neglected, a company is at risk of losing its reputation, money and even, business. Legal charges may be pressed against the company if their food causes food poisoning or disease.

Steps to make sure that processed food is safe and edible are careful selection of ingredients, storing, processing, storing of processed food, and serving. Food handlers should pay attention to personal hygiene besides paying attention to the selection of ingredients, storing, processing, storing of processed food, and serving.

4.4 Influence between Knowledge, Habit Formation and Hygiene Behavior

Based on the elaboration, there are direct and indirect influences. The direct influence is between knowledge and behavior, as well as habit formation and behavior. Meanwhile, the indirect one is between knowledge and behavior through habit formation by the teachers.It means the higher level of knowledge followed by intensive habit formation (repetition, reinforcement and examples) will result in increasing implementation of hygiene behavior during food processing class. At the opposite, lack of knowledge and less intensive habit formation will result in decreasing implementation of hygiene behavior.

V. CONCLUSION AND SUGGESTIONS

The study describes that:

- The students have good knowledge on the food hygiene principles. It means the "Sanitasi, Higiene, dan Keselamatan Kerja" class they attended in the 1st and 2nd semesters successfully developed the students' knowledge on the principles of food hygiene.The most prominent aspect of the food hygiene the students understand is the one related to personal hygiene.The observation towards the students' hygiene behavior in the food processing class revealed that 45.20% of the students have good knowledge in personal hygiene.
- The teachers frequently develop the students' habit formation to apply the food hygiene principles during the class.
- The students had very good hygiene behavior during the food processing class, more importantly their personal hygiene.
- Another finding is that knowledge, habit formation and behavior had significant influence towards each other. Higher understanding and more intensive habit formation will result in more improved behavior and eventually better characteristic.On the other hand, without habit formation, knowledge will not have as significant influence on behavior. Therefore, habit formation has pivotal role in character building, hygiene behavior to be more specific.
- Related to the findings, it is expected that teachers, especially ones responsible for teaching food processing class, develop students habit formation related to the food hygiene principles consistently. The habit formation should be conducted repeatedly, along with reinforcement (rewards and punishment) as well as teachers' examples.

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