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A study on the recognition of odor in Wonju traditional market, Gangwon-do

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Abstract

Purpose: This study aims to study the perception of merchants and customers about the odor problem of traditional markets in Wonju, Gangwon-do. **Research design, data and methodology:** A survey was conducted to investigate the perception. The survey consisted of 11 questions for merchants and 12 questions for customers. **Results:** In a survey of merchants - The question 'What kind of smell did you smell at the traditional market?' was investigated with multiple responses. Regarding the odor experience, unclean odor was the highest with 105 votes (36%), followed by rotting odor with 82 votes (28.1%) and other odors with 44 votes (15.1%). In a survey of customers - The question 'What kind of smell did you smell at the traditional market?' was investigated with multiple responses. As a result of the survey, filthy smell was the highest with 98 votes (43.2%). Next, rotten smell was found with 60 votes (26.4%) and others with 31 votes (13.7%). **Conclusions:** If the odor problem in the traditional market is solved, the economic and health damage to the merchants will be reduced. Further, it will help to revitalize traditional markets by increasing customer visits. As a solution, it is judged that it is good to study the direction of the establishment of a real-time monitoring system and the preparation and application of odor removal measures.

Keywords : Traditional Market, Odor, Recognition, Survey

JEL Classification Code : E44, F31, F37, G15

1. Introduction

Traditional markets are the contact point where people, space, and economy meet. It is a commercial space representing a region where various employment-related

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entities have developed a business and established a system to interconnect them. It also functions as a complex space where you can experience local customs and communities. Currently, traditional markets offer a variety of shopping options, including vegetables, fruits, meat, seafood, ready-to-eat food, and side dishes. However, it lacks competitiveness compared to large marts due to narrow passageways, various odors, lack of hygiene management, country of origin labeling, and lack of parking space. Among the various factors that lower the competitiveness of traditional markets, the odor problem is the most serious. The causes of bad odor are 1) bad odor during cooking in restaurant, 2) bad odor from sewer, and 3) bad odor from food waste.

1) Bad odor during restaurant cooking

Due to the increase of single-person households, income improvement, and the spread of dining out culture, the living area of restaurants has expanded, and complaints about smoke and odors generated during the cooking process have increased. Bad odors from restaurants are difficult to manage through substance concentration regulations because there are almost no substances corresponding to 22 kinds of odor substances designated by the domestic standard, and complex odors are the cause. The current management method uses a simple method of resolving by dilution by diffusion after ventilation and local exhaust. Therefore, complaints around the outlet of the tuyere increase.

2) Sewer odor

The most common cause of complaints about odor is odor from the sewer, accounting for 78% of all complaints. Sewer odors are caused by sediment decay. The main causative substances are hydrogen sulfide and ammonia, which are caused by the decay of domestic sewage and manure during residence.

3) Food waste odor

It is not easy to set up a separate collection point for food waste generated in traditional markets. Therefore, it is left in the vicinity of the store, causing a bad odor or not looking good, and there is a problem that food waste and general waste are mixed and thrown away.

The purpose of this study was to study the perception level of the traditional market in Wonju-si, Gangwon-do.

2. Literature Review

After the modernization of the facilities in the traditional market, the satisfaction of merchants and consumers in the traditional market was analyzed. The third place among complaints about traditional markets was unsanitary, stench and noise. This study found that consumers' awareness level (57.7%) changed significantly after the modernization of

traditional markets. Satisfaction (44.2%) was found to be generally satisfactory. 41.3% of consumers answered that they were satisfied with the removal of odors and noises after facility modernization. However, even after the modernization of the facilities, it was found that although both merchants and workers improved in terms of noise and odors, they did not meet expectations. There is a need for continuous improvement and development. (Kim et al, 2009)

As a result of a survey to find out whether sanitary conditions affect merchants' satisfaction with the business environment, 72% answered that hygiene conditions affect their satisfaction with business. As a result of the analysis of the factors affecting the sanitary condition, opinions such as 'It is dirty because it is not cleaned well', 'The market smells bad', and 'Aesthetic tidying up is necessary' appeared. In particular, the overwhelming majority of opinions that improvement of odor is necessary. The cause of the odor was the problem of sewage, garbage dump, and the smell of products in the market. It was found that the better the sanitary condition of the market, the higher the sales satisfaction of merchants, which affects the expected sales. (Lim & Lee, 2021)

As such, as a result of previous studies, the odor generated in the traditional market of merchants and customers is recognized as a problem to be solved. Even through modernization of facilities in traditional markets, it is not completely resolved, so continuous management is required. In particular, odor is one of the important problems in the traditional market recognized by merchants and consumers, and there was a sense that it should be solved. Therefore, in this study, the perception of the odor problem of the traditional market in Wonju, Gangwon-do is investigated and used as an index for solving the problem in the future.

3. Research Methods and Materials

A survey was conducted to investigate the perception. The survey consisted of 11 questions for merchants and 12 questions for customers. In addition, personal information was investigated. There were 210 samples from merchants and 204 samples from customers. The questions about merchants are presented in Table 1 and the questions about customers are presented in Table 2.

Table 1: Questionnaire (Merchant)

No.	Question	Option
1	How long is the business period?	① within 1 year ② 1 year to less than 5 years ③ 5 years or more but less than 10 years

		④ 11 or more and less than 20 years ⑤ more than 20 years
2	What kind of smell did you smell at the traditional market?	① rotten smell ② burning smell ③ filthy odor ④ pungent smell ⑤ salty smell ⑥ Etc.
3	How strong is the smell you experienced at the traditional market?	① very strong ② strong ③ neutral ④ weak ⑤ very weak ⑥ no response
4	What is the frequency of odors in traditional markets?	① 1 or more times per day ② At least once in 2-3 days ③ once a week ④ 1 time in 15 days ⑤ Etc.
5	When is the stinky season in the traditional markets?	① Spring ② Summer ③ Fall ④ Winter
6	When is the stinking time in the traditional market?	① Morning ② Afternoon ③ Dinner ④ Late night ⑤ Etc.
7	Where are the stinky places in traditional markets?	① Manhole ② Store ③ Rain gutter ④ Dumpster ⑤ Etc.
8	What do you think is the cause of bad odors in traditional markets?	① Sewer pipe ② Restaurant ③ Garbage ④ Toilet ⑤ Etc.
9	How much health damage is caused by bad smells in traditional markets?	① very much damage ② little bit of damage ③ Neutral ④ no damage ⑤ no damage at all
10	How much is the economic damage from bad smells in traditional markets?	① very much damage ② little bit of damage ③ Neutral ④ no damage ⑤ no damage at all
11	If you have a policy or method to solve the odor in the traditional market, please feel free to write it.	Subjective question

Table 2: Questionnaire (Customer)

No.	Question	Option
1	How often do you visit traditional markets?	① 5 or more times a week ② 1-4 times a week ③ More than once a month ④ More than once every 6 months ⑤ Etc.
2	What kind of smell did you smell at the traditional market?	① rotten smell ② burning smell ③ filthy odor ④ pungent smell ⑤ salty smell
3	How strong is the smell you experienced at the traditional market?	① very strong ② strong ③ neutral ④ weak ⑤ very weak ⑥ no response
4	What is the frequency of occurrence of odors experienced in the traditional market?	① I feel it every time I visit. ② I feel it once in 2~4 visits. ③ I feel it once in 5 visits. ④ I feel it once in 10 visits. ⑤ Etc.
5	When is the stinky season in the traditional markets?	① Spring ② Summer ③ Fall ④ Winter
6	When is the stinking time in the traditional market?	① Morning ② Afternoon ③ Dinner ④ Late night ⑤ Etc.
7	Where are the stinky places in traditional markets?	① Manhole ② Store ③ Rain gutter ④ Dumpster ⑤ Etc.
8	What do you think is the cause of bad odors in traditional markets?	① Sewer pipe ② Restaurant ③ Garbage ④ Toilet ⑤ Etc.
9	Have you ever used a department store or other places because of the stench in the traditional market?	① I have that experience. ② I have no such experience. ③ Etc.
10	Have you ever filed a complaint about the stench of a traditional market?	① very often ② often ③ Once in a while ④ rarely ⑤ not at all
11	Are you willing to use the traditional market more if the odor is resolved?	① Strongly Agree ② Agree ③ Neutral ④ Disagree ⑤ Strongly Disagree

12	If you have a policy or method to solve the odor in the traditional market, please feel free to write it.	Subjective question
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4. Results and Discussion

4.1. Personal Information

The number of merchants who responded to this survey was 210, and the age group between 60 and 69 years old (66 people, 31.4%) was the most common. It was followed by 50-59 years old (61 people, 29%) and 40-49 years old (42 people, 20%) in that order. By gender, 38 (18.1%) were male, 153 (72.9%) were female, and 19 (9%) did not respond. As for family members, the two-person household showed the highest number with 68 (32.4%), followed by the three-person household and the four-person household with 43 (20.5%) each. By place of residence, the number of people residing in Jungang-dong was the highest with 42 (20%), followed by Sangjae-dong and Bangok-gwanseol-dong with 19 (9%) each. As for the period of residence, 71 people (33.8%) had the highest number of people living there, followed by 48 people (22.9%) for 10-20 years, and 26 people (12.4%) for 6-10 years.) appeared in that order. In terms of commercial type, other industries showed the highest number with 105 (50%), followed by restaurants with 41 (19.5%) and agricultural industry with 13 (6.2%).

There were 204 customers who responded to this survey, and 57 people (27.9%) aged 50 to 59 by age showed the most. Next, 41 (20.1%) aged 40 to 49, and 60 to 69 (17.2%). By gender, there were 71 males (34.8%), 107 females (52.5%), and 26 non-responders (12.7%). As for family members, a four-person household had the highest number with 58 (28.4%), followed by a two-person household with 43 (21.1%) and a three-person household with 35 (17.2%). By place of residence, the number of people living in Dangu-dong was the highest with 25 (12.3%), followed by Step-dong with 19 (9.3%) and Jungang-dong with 17 (8.3%). As for the length of residence, 55 (27%) of those who have lived there for more than 20 years showed the highest number, followed by 43 (21.1%) of 10-20 years and 31 (15.2%) of 6-10 years.) appeared in that order. In terms of occupation, self-employment was the highest with 63 people (30.9%), followed by housewives with 28 (13.7%) and agriculture industry with 13 (6.2%).

4.2. Survey Results (Merchants)

In the question of ‘How long is the business period?’, 78 people (37.1%) who had 20 years or more answered the

most. Next, 52 patients (24.8%) were from 11 years to less than 20 years, and 38 patients (18.1%) were from 1 year to less than 5 years.

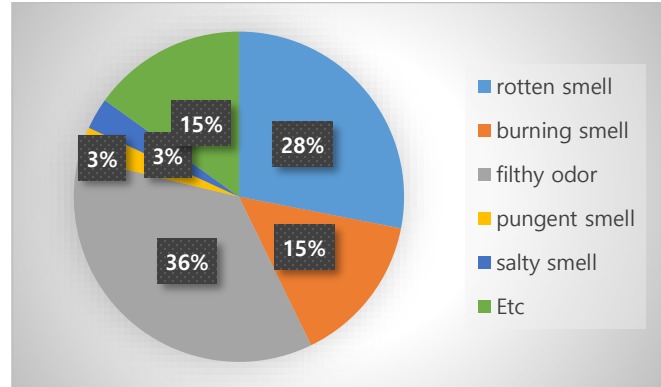


Figure 1: ‘What kind of smell did you smell at the traditional market?’ answer result(merchants)

The question ‘What kind of smell did you smell at the traditional market?’ was investigated with multiple responses. Regarding the odor experience, unclean odor was the highest with 105 votes (36%), followed by rotting odor with 82 votes (28.1%) and other odors with 44 votes (15.1%).

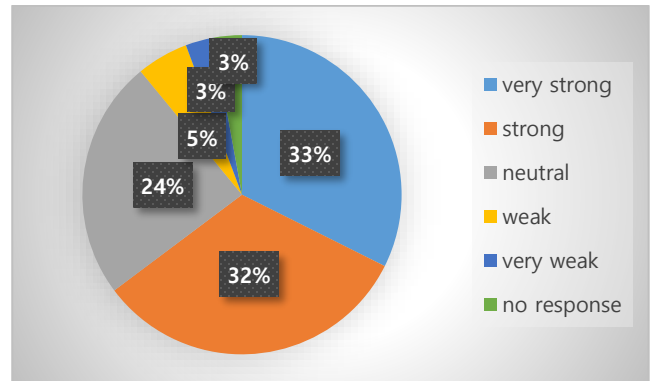


Figure 2: ‘How strong is the smell you experienced at the traditional market?’ answer result(merchants)

In the question ‘How strong is the smell you experienced at the traditional market?’, 68 people (32.4%) said very strong and a little strong respectively, followed by 51 people (24.3%) who said neutral.

In the question ‘What is the frequency of odors in traditional markets?’, 84 people (40%) answered at least once a day. Next, once every 2-3 days was found in 54 (25.7%) and once a week in 32 (15.2%). The question ‘When is the stinky season in the traditional markets?’ was surveyed with multiple responses. As a result of the survey, summer was the highest with 191 votes (74%). Next came winter with 26 votes (10.1%) and spring with 22 votes

(8.5%). The question ‘When is the stinking time in the traditional market?’ was investigated with multiple responses. As a result of the survey, afternoon time was the highest with 125 votes (50.6%). Next was morning with 64 votes (25.9%) and others with 29 votes (11.7%).

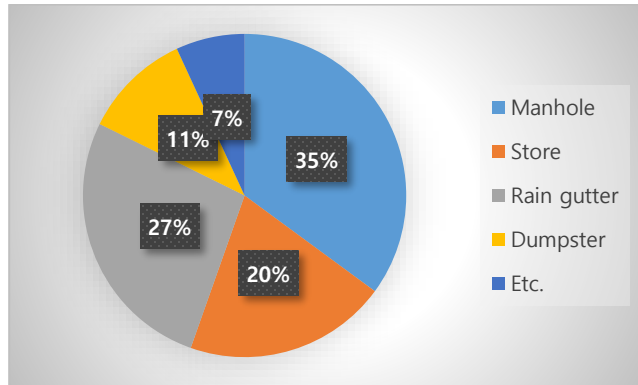


Figure 3: ‘Where are the stinky places in traditional markets?’ answer result(merchants)

The question ‘Where are the stinky places in traditional markets?’ was surveyed with multiple responses. As a result of the survey, manhole was the highest with 105 votes (35%). The next place was garbage dumps with 83 votes (27.7%) and stores with 67 votes (22.3%). In the survey ‘What do you think is the cause of bad odors in traditional markets?’, multiple responses were used. As a result of the survey, sewage pipe was the highest with 107 votes (35.1%). It was followed by garbage with 82 votes (26.9%) and restaurants with 62 votes (20.3%). For the question ‘How much health damage is caused by bad smells in traditional markets?’, 94 people (44.8%) showed the highest response that was neutral. The next little bit of damage was 44 (21%), and 30 (14.3%) was no damage. When asked, ‘How much do you think the economic damage caused by the reduction of foul odors or odors in the market?’, the highest with 79 people (37.6%) that was neutral. The next little bit of damage was 45 (21.4%) and no damage 45 (21.4%). ‘If you have a policy or method to solve the odor in the traditional market, please feel free to write it.’ As a result of the survey, the most common opinion was to clean the sewer pipe and dispose of garbage frequently. In addition, various opinions such as the fine system and the expansion of non-smoking areas appeared.

4.3. Survey Results (Customers)

When asked, ‘How often do you visit traditional markets?’, 82 people (40.2%) answered once to 4 times a week. Next, 67 people (32.8%) more than 5 times a week, and 26 people (12.7%) more than once a month.

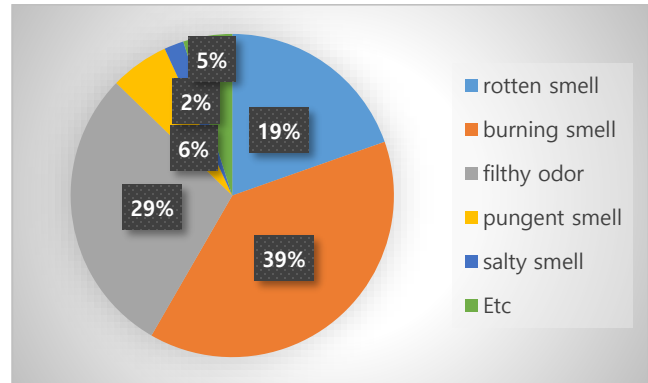


Figure 4: ‘What kind of smell did you smell at the traditional market?’ answer result(customers)

The question ‘What kind of smell did you smell at the traditional market?’ was investigated with multiple responses. As a result of the survey, filthy smell was the highest with 98 votes (43.2%). Next, rotten smell was found with 60 votes (26.4%) and others with 31 votes (13.7%).

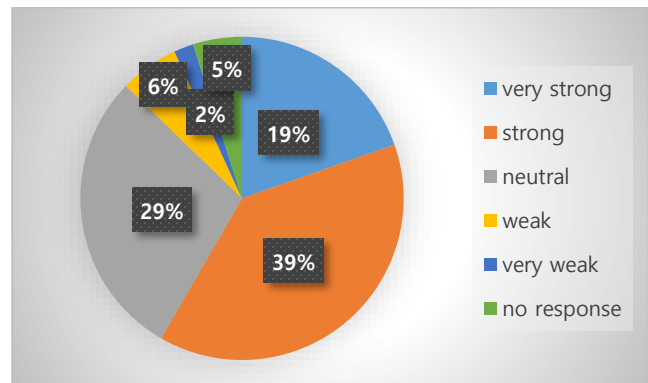


Figure 5: ‘How strong is the smell you experienced at the traditional market?’ answer result(customers)

For the question of ‘How strong is the smell you experienced at the traditional market?’, 79 people (38.7%) answered strong. Next, neutral was 59 people (28.9%), and very strong was 40 people (19.6%). When asked, ‘What is the frequency of occurrence of odors experienced in the traditional market?’, 79 people (38.7%) answered that they felt it every time they visited. Next, 73 (35.8%) felt it at least once every 2 to 4 visits, 15 (7.4%) felt it at least once every 5 visits, and 15 (7.4%) each. The question ‘When is the stinky season in the traditional markets?’ was surveyed with multiple responses. As a result of the survey, summer was the highest with 178 votes (80.9%). Next came fall with 16 votes (7.3%) and spring with 15 votes (6.8%). The question ‘When is the stinking time in the traditional market?’ was investigated with multiple responses. As a result of the survey, afternoon showed the highest with 140 votes (63.3%). Next was morning with 29 votes (13.1%) and

evening with 28 (12.7%).

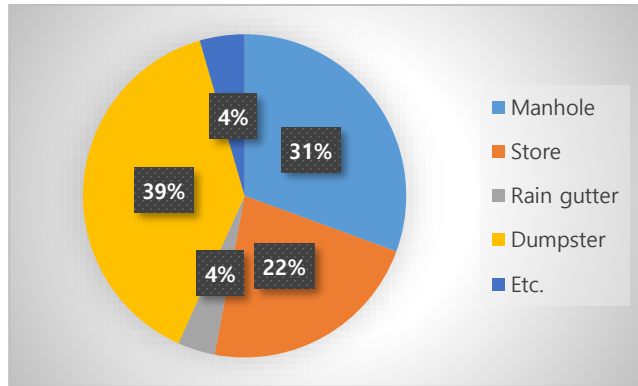


Figure 6: 'Where are the stinky places in traditional markets?' answer result(customers)

The question 'Where are the stinky places in traditional markets?' was surveyed with multiple responses. As a result of the survey, the garbage dump was the highest with 104 votes (38.8%). Manholes were next with 82 votes (30.6%), followed by stores with 60 votes (22.4%). The question 'What do you think is the cause of bad odors in traditional markets?' was investigated with multiple responses. As a result of the survey, garbage was the highest with 88 votes (34.6%). Next was sewer pipes with 83 votes (32.7%) and restaurants with 49 votes (19.3%). To the question 'Have you ever used a department store or other places because of the stench in the traditional market?', 'I have no such experience' was the highest with 92 people (45.1%). 'I have that experience' was followed by 86 people (42.2%) and 8 people (3.9%) other. When asked 'Have you ever filed a complaint about the stench of a traditional market?', 67 patients (32.8%) answered 'rarely'. Next, 'not at all' was followed by 59 (28.9%) and 'often' by 32 (15.7%). To the question 'Are you willing to use the traditional market more if the odor is resolved?', 78 respondents (38.2%) answered 'Agree' the most. Next was 'Strongly Agree' with 76 (37.3%) and 'Neutral' with 27 (13.2%). 'If you have a policy or method to solve the odor in the traditional market, please feel free to write it.' As a result of the survey, the most common opinions were cleaning regularly, disposing of garbage in a timely manner, and repairing sewer pipes.

5. Conclusions

As a result of the study, in common question 3 (How strong is the smell you experienced at the traditional market?) about merchants and customers, more than half of the merchants and customers felt bad odor. As for the type of odor, unclean smell and rotting smell accounted for more than half. These odors are odors from sewers and decay.

Merchants and customers answered that manholes (sewers), stores (food spoilage), and garbage dumps (corruption) were the main causes. This seems to be a result consistent with the type of odor. When asked about the physical and economic damage caused by bad odors, merchants said that one-third of merchants said they suffered damage. It was found that the stench in traditional markets is strongest in summer. More than 75% of customers said they would use more if the odor problem is solved in the market. Therefore, the odor problem in traditional markets must be resolved. If the odor problem in the traditional market is solved, the economic and health damage to the merchants will be reduced. In addition, it will help to revitalize traditional markets by increasing customer visits as a solution, it is judged that it is good to study the direction of the establishment of a real-time monitoring system and the preparation and application of odor removal measures. For this, government-level support is needed, and related research projects are needed. An example is the prevention facility operation system linked to the monitoring system using IoT technology. The results of this study are worth using as a reference when planning future research to solve the odor problem in traditional markets. In addition, it can be used as useful data to compare changes in perception.

References

- Kim, M. J., & Ryu, S. M. (2016). Qualitative analysis of traditional market vitalization: focused on traditional market in Korea. *Journal of channel and retailing*, 21(4), 157-177.
- Kim, P. J., Kim, K. J., Namkoong, S., & Youn, M. G. (2009). A study on consumer awareness following the modernization of facilities in traditional markets - for consumers in Mokpo area. *Journal of Distribution Science*, 7(1), 55-70. doi: 10.15722/jds.7.1.200903.55
- Kim, S. H., Cho, D. M., Kwon, L. S., & Jung, M. J. (2021). Measurement and Analysis of Odors Generated in Traditional Markets. *Journal of Wellbeing Management and Applied Psychology*, 4(4), 35-41. doi: 10.13106/JWMAP.2021.VOL4.NO4.35
- Lim, S. H., & Lee, K. H. (2021). The Influence of Market Environment Characteristics in Traditional Markets on the Environmental Satisfaction of Retailer and Expected Sales-A Case Study of the Jungang Traditional Market in Cheonan. *Journal of the Architectural Institute of Korea*, 37(5), 125-132. doi: 10.5659/JAIK.2021.37.5.125
- Lim, Y. T., & Jeon, S. M. (2010). A Study on Typology of Traditional Markets and its Vitalization. *JOURNAL OF KOERAN REGIONAL DEVELOPMENT*, 10(1), 165-190.
- Mafra-Neto, A., & Dekker, T. (2019). Novel odor-based strategies

for integrated management of vectors of disease. *Current opinion in insect science*, 34, 105-111. doi: 10.1016/j.cois.2019.05.007

Ryu, T. C. (2010), Revitalization of Culture Tourism Oriented Traditional Market. *Urban Information Service*, (340), 15-16.

Sipahutar, H. (2016). Factors Affecting Traditional Markets Competitiveness. *Jurnal Bina Praja: Journal of Home Affairs Governance*, 8(1), 27-38. doi: 10.21787/jbp.08.2016.27-38