Abstract: To examine the safety of food purchased online, a food safety project was conducted by the Office of Food and Drug Safety (OFDS) of Taichung City. Through collaboration with eight universities, the performance of food safety and hygiene in the physical stores engaged in online food businesses was assessed from October 2021 to January 2022. A total of 80 physical stores were involved in the present project. The results indicate that the most common nonconformities were as follows: (1) the food service standard form contract for distance transactions was not correctly displayed on websites (71%), (2) the food-related items were not sorted, were not stored on pallet boards or racks, and were not kept clean (46%), (3) the food preparation area and sales area did not have appropriate and adequate equipment for hand washing and drying (33%), and (4) the food safety and hygiene self-evaluation checklist was not prepared (33%). More efforts regarding food safety and hygiene are needed to improve and secure the knowledge of, attitude towards, and skills for good food safety and hygiene practices of online food businesses.

Keywords: food safety and hygiene; online food business; Taiwan

1. Introduction

Since the rise of the internet in the 1990s, the global retail electronic commerce (e-commerce) market size was estimated to be USD 5.2 trillion in 2021 and is expected to reach USD 8.1 trillion by 2026 [1]. According to the Organization for Economic Cooperation and Development (OECD), e-commerce is defined as “the sale or purchase of goods or services, conducted over computer networks by methods specifically designed to receive or place order” [2]. Living in the digital or information age, there is no doubt that more and more consumers will be directly involved in e-commerce transactions. Moreover, the outbreak of the coronavirus disease 2019 (COVID-19) pandemic fueled the growth of e-commerce, particularly online food product shopping [3–5]. After the World Health Organization (WHO) announced that COVID-19 was a pandemic on March 11, 2020 [6], several public health approaches were implemented in countries to prevent its spreading. For example, to maintain social distancing and avoid crowds and close contact, it is recommended to wear a face mask properly and wash hands frequently and thoroughly with soap and water or an alcohol-based hand rub. Lockdowns encompass stay-at-home orders, quarantines, and travel restrictions [7,8]. Such approaches prohibit eating food together and indoor dining in restaurants, which has further pushed consumers toward online food shopping [3,9,10]. An analysis of the data from the agri-food e-commerce platform revealed that an additional confirmed case of COVID-19 raised sales by 5.7% and the number of customers by 4.9% [10]. Therefore, it is important to focus on the food safety of ordering and delivering food online to consumers. In addition, food safety must be resolved from a food safety engineering perspective to ensure the success of the food safety management system [11]. In response
to the concerns and issues regarding the safety of food purchased online, the Office of Food and Drug Safety (OFDS) of Taichung City actively carried out a food safety project in collaboration with academic scholars of food-related fields from eight universities to evaluate the performance of food safety and hygiene self-management in physical stores engaged in online food businesses. The overall objective of the food safety project was to strengthen the ability of physical stores engaged in online food businesses in Taichung City to self-manage food safety and hygiene.

2. Materials and Methods

2.1. Expert Team and Qualified Food Safety Evaluators

The OFDS has relied on the expertise of academic scholars and industry specialists to complete food safety-related projects through the collaboration of industry-government-university in recent years. In the present food safety project, Chaoyang University of Technology was the project coordinator to monitor and control the process and efficiency of the project. The other partner universities were Hungkuang University, Taipei Medical University, Tunghai University, Asia University, Central Taiwan University of Science and Technology, National Chunghsing University, and Overseas Chinese University. Nine academic scholars from the eight universities formed an expert evaluation team. The project content was divided into different tasks according to the expertise of each academic scholar.

Before the project execution phase, the expert evaluation team members discussed the implementation details and time scheduling of the project, the applicable food safety-related laws and regulations, the food safety and hygiene evaluation checklist, the evaluation standards, and the key evaluation points. An industry specialist from the Food Industry Research and Development Institute was invited to join the meeting. The expert evaluation team carefully reviewed every question on the food safety and hygiene checklist for evaluation based on the “Regulations on Good Hygiene Practice (GHP) for Food” [12]. To increase the efficiency of project execution, more qualified evaluators were recruited to join the project. However, all potential evaluators had to attend a consensus meeting and 3 h lecture training for online food safety. The lecturers were experts who had practical work experience. After the meeting, the participants took an examination, and had to obtain a score of at least 80 points. The list of potential evaluators was sent to the OFDS to acquire the final approval for performing the on-site evaluations.

2.2. Food Safety Education and Regulations

Before running the on-site performance assessment, two workshops were held online for food businesses. Each workshop had 4 main topics: (1) the explanation of the food safety project (1 h); (2) the explanation of GHP regulations (1 h); (3) the registration platform of food business, the foodservice standard form contract for distance transactions, and what must be displayed on the web page (1 h); and (4) the regulations on imported food and relevant product inspection and correct food labeling in standard Chinese (1 h). The lecturers were food safety experts.

2.3. On-Site Food Safety Evaluations

The on-site assessment of food safety and hygiene in physical stores engaged in online food business started on 8 October 2021 and ended on 13 January 2022. The list of stores was provided by the OFDS. At least one evaluator and one OFDS officer made up the evaluation team to perform every on-site evaluation together. In addition to checking whether the stores were in keeping with the regulatory standards of GHP, the completeness of information for the registration platform of food business, the conformance levels of webpage content to the foodservice standard form contract for distance transaction, the completion of imported food and relevant products inspection procedures, and the accuracy of food labeling in standard Chinese were also checked.
2.4. Data Analysis

The data were analyzed and integrated after collecting all evaluation records. The major nonconformities found from the on-site food safety and hygiene evaluation were then identified. Practical suggestions regarding the nonconformities were proposed for reference of the OFDS in making related policies.

3. Results

Thirty-one qualified evaluators, including food safety experts, academic scholars, and OFDS retirees, were approved by the OFDS to perform the on-site evaluations. Before the on-site evaluations, more than 100 online food business workers attended the 2 workshops to obtain related information. A total of 80 physical stores, including 17 food manufacturing companies, 30 restaurants, and 33 online-only food stores participated in the present project (Table 1). Most physical stores were in the downtown area (71%), and those in mountain and coast areas were 16% and 13%, respectively.

Table 1. Distribution of physical stores engaged in online food businesses participated in the Food Safety project of Taichung City from October 2021 to January 2022.

<table>
<thead>
<tr>
<th>District</th>
<th>Food-Manufacturing Company</th>
<th>Restaurant</th>
<th>Online-Only Food Store</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Downtown area</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Central</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>East</td>
<td>4</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>South</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>West</td>
<td>5</td>
<td>2</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>North</td>
<td>5</td>
<td>4</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Beitun</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>Xitun</td>
<td>6</td>
<td>3</td>
<td>5</td>
<td>14</td>
</tr>
<tr>
<td>Nantun</td>
<td>7</td>
<td>4</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Mountain area</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fengyuan</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Houli</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Xinshe</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daya</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Wuri</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Dali</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Wufeng</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coast area</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dadu</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shalu</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wuqi</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Qingshui</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Dajia</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Daan</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>17</td>
<td>33</td>
<td>80</td>
</tr>
</tbody>
</table>

The performance assessment results revealed that the top three nonconformities were as follows: (1) the foodservice standard form contract for distance transaction was not correctly displayed; (2) the food-related items were not sorted and stored on pallet boards or racks, and not kept clean; and (3) the food preparation area, as well as sales area, did not have appropriate and adequate equipment for hand washing and drying, and the food
safety and hygiene self-evaluation checklist was not prepared. The other nonconformities found are shown in Table 2.

Table 2. Top 10 major nonconformities found in physical stores engaged in online food businesses inspected for food safety and hygiene in Taichung City from October 2021 to January 2022.

<table>
<thead>
<tr>
<th>No.</th>
<th>Nonconformities</th>
<th>Unqualified Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The foodservice standard form contract for distance transaction was not correctly displayed.</td>
<td>71%</td>
</tr>
<tr>
<td>2</td>
<td>The food-related items were not sorted, were not stored on pallet boards or racks, and not kept clean.</td>
<td>46%</td>
</tr>
<tr>
<td>3</td>
<td>The food preparation area, as well as sales area, did not have appropriate and adequate equipment for hand washing and drying.</td>
<td>33%</td>
</tr>
<tr>
<td>4</td>
<td>The food safety self-evaluation checklist was not prepared.</td>
<td>33%</td>
</tr>
<tr>
<td>5</td>
<td>There were no assigned sanitation personnel to keep daily records regarding to GHP.</td>
<td>31%</td>
</tr>
<tr>
<td>6</td>
<td>The food products sold online did not have required food labeling.</td>
<td>28%</td>
</tr>
<tr>
<td>7</td>
<td>There was mold, dust, or peeling on walls, pillars, floors, or ceilings of workplace.</td>
<td>26%</td>
</tr>
<tr>
<td>8</td>
<td>The raw materials’ semi-finished products and food packaging supplies were not properly stored or clearly marked with date.</td>
<td>23%</td>
</tr>
<tr>
<td>9</td>
<td>The workers did not attend sanitation workshop or keep the records.</td>
<td>20%</td>
</tr>
<tr>
<td>10</td>
<td>The food labeling as well as nutrition facts did not comply with relevant regulations.</td>
<td>20%</td>
</tr>
</tbody>
</table>

4. Conclusions and Suggestions

More and more people shop and sell foods and relevant products online with the development of e-commerce, especially after the COVID-19 pandemic. Online food shopping has gradually become the culture of the new normal for shopping for food from restaurants, food manufacturing companies, or online retailers in our daily life. There are increasing concerns about online food safety, such as online food labeling, food traceability, food hygiene practices, and food transportation, [13–15]. Food safety is the most critical issue related to food supply, which needs to be solved from the perspective of food safety engineering, including food safety detection and food safety management systems [11]. Food safety and hygiene performance assessment, therefore, could serve as an important measure for health protection [16].

The results of the current food safety project indicated that most physical stores engaged in online food businesses did not follow “the items that must and must not be stated in the foodservice standard form contract for distance transactions”, amended and declared in 2017 by the Ministry of Health and Welfare (MOHW) of Taiwan for the contents displayed on the websites [17]. The incomplete and inaccurate information on the websites may mislead consumers and cause potential food safety hazards. Incorrect food labeling and nutrition fact information were also observed in several foods sold online. In the case of potential allergens, the customers may have severe allergic reactions if the allergens were not listed. The other major nonconformities were linked to the GHP standards, for instance, poor storage, lack of environmental hygiene, and poor self-management of food safety and hygiene practices. The training and knowledge about GHP seemed to be inadequate for the workers from the inspected physical stores engaged in online food businesses. It is interesting that new online stores selling many things besides food were not familiar with the food business registration system and thus did not apply for the food business registration number.

Based on the above findings, it was found that there is an urgent need for the authorities to perform on-site food safety and hygiene evaluations for online food businesses
to increase the understanding and adherence of physical stores engaged in online food businesses to online business laws and regulations, to improve and strengthen the training and knowledge about GHP through continuous learning in sanitation workshops, and to raise the awareness of customers on how to shop safely for online food shopping.

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Data Availability Statement: Data are contained within the article.

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Conflicts of Interest: The authors declare no conflict of interest.

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