

Review

New technology for food systems and security

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In addition to product trade, technology trade has become one of the alternatives for globalization action around the world. Although not all technologies employed on the technology trade platform are innovative technologies, the data base of international technology trade still is a good indicator for observing innovative technologies around world. The technology trade data base from Sinew Consulting Group (SCG) Ltd. was employed as an example to lead the discussion on security or safety issues that may be caused by these innovative technologies. More technologies related to processing, functional ingredients and quality control technology of food were found in the data base of international technology trade platform. The review was conducted by categorizing technologies into the following subcategories in terms of safety and security issues: (1) agricultural materials/ingredients, (2) processing/engineering, (3) additives, (4) packaging/logistics, (5) functional ingredients, (6) miscellaneous (include detection technology). The author discusses examples listed for each subcategory, including GMO technology, nano technology, Chinese medicine based functional ingredients, as well as several innovative technologies. Currently, generation of innovative technology advance at a greater pace due to cross-area research and development activities. At the same time, more attention needs to be placed on the employment of these innovative technologies.

Key Words: technology trade, innovative technology, technology appraisal, food technologies, food safety

INTRODUCTION

Globalization is a popular trend in the food industries today. In addition to traditional product trade, technology trade becomes one of the alternatives “products” for globalization. More and more brokers provide services for technology trade around world, in addition to this more broker networks or international platform alliances are available. Although not all technologies employed on the technology trade platform are innovative technologies, the data base of international technology trade still is a good indicator for observing innovative technologies around world. The technology trade data base from Sinew Consulting Group (SCG) Ltd. was employed as an example to lead the discussion on security or safety issues that may be caused by these innovative technologies. Sinew Consulting Group’s data base include areas in foods, cosmetics, personal cares, agricultural technology, biotechnology, medical technology, health devices as well as environmental/energy.

METHODS

The international technology trade platform usually divides food related technologies into 7 subcategories. They are: (1) materials, (2) processing, (3) packaging, (4) machinery, (5) preservation Treatment, (6) functional Ingredients, and (7) quality control technology. There are 402 technologies provided on this platform related to foods and beverages areas while the numbers of technology needs/request are not included. These technologies are from (1) governmental organizations in Taiwan and China, (2) non-profit research institutes in Taiwan, (3) universities in Taiwan and China, (4) private sectors in

Taiwan and China, (5) international broker partners (the research institutes, universities, private sectors of US, Canada, Japan, Korea, EU, Israel, Russia etc.)

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RESULTS AND DISCUSSIONS

The overall subcategories and their frequencies of technologies in SCG’s data base are shown as Table 1.

Examples are listed for each subcategory. The examples include genetically modified organism (GMO) technologies, natural ingredients from fermentation instead of traditional sources, traditional ingredients from so called “new found” microorganisms, and new chemical methods in the subcategory of agricultural materials and food ingredients. Genetically modified organism technologies have created huge opportunities as well as disagreements

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Table 1. The subcategory of technologies in food related areas and its frequencies according to SCG's technology data base (402 technologies)

Subcategory	Percentage
Materials	14%
Processing	24%
Packaging	10%
Machinery	11%
Preservation Treatment	4%
Functional Ingredients	20%
Quality Control Technology (Detection Technology)	19% (9%)
Green energy	1%

at the same time. No obvious health and safety issues had been reported, while doubts had never subsided. So called natural ingredients that can now be produced from "new" fermentation process or "newly discovered" microorganisms may also bring about safety concerns. Examples of "newly discovered" microorganisms include those found in infant feces and in soil. The contamination of pathogens and chemicals on agricultural materials is not covered here since these problems are not caused by innovative technologies in general.

The subcategory of processing and engineering include: nano-technologies, microwave combined heat or drying processing or irradiation processing, electromagnetic technology, super-critical extraction, and high pressure technology. Nano-technology has been introduced from the chemical engineering area and draws plenty of attention from both the food and drug sector. The so called nano level in the area of food technology is actually more related to the so called near nano size and not the true nano size. The major intention of these technologies is to try to improve the absorption of nutritious or functional ingredients. This, however, also aroused the question of what the nano particles would do inside the human body in addition to the intended effect. The combination of microwave, irradiation, and other heat sources is getting more and more attention as a more efficient form of heating. Whether this extra energy from different waves cause extra free radicals in foods and whether these free radicals are safe or not remain as an issue of interest. Super-critical extraction and high pressure treatment also create a non-traditional environment for foods. Are there any unbound changes in foods? Food scientist may need to find the answer.

Food additives include natural anti-microbial reagent and additives produced by fermentation. These technologies may have similar problems as described in the section of agricultural materials and ingredients.

For the subcategory of food packaging and logistics, examples include microwavable packages, edible films, and new package designs. Will these microwavable packages and edible films bring any hazard or potential risk to us? Will the new package design bring new food safety

issues? The author believes that both commercial opportunity and potential risk exist at the same time.

There are functional peptides, Chinese medicine based functional ingredients, so called "new found" functional ingredients, and traditional compounds from new methods, as examples for the subcategory of functional ingredients. This area draws the most attention from food scientist, food nutritionist, pharmacy chemist and medical scientist due to its huge potential benefits. Chinese medicine has been recognized as an alternative medical treatments in several countries. The situation is that Chinese medicines are well known but not well accepted around world. The ability to prove the safety of compounds in Chinese medicines, as well as other herbs and alternative medicines from other regions scientifically will be the challenge for scientists.

In the miscellaneous subcategory, there are several innovative detection technologies that may have their different impacts on food safety and security issues. New detection technology would modify or change the recognition or knowledge of safety and security issues. In terms of green energy, the technology of transforming wasted sewage oil into bio-fuel and modular wind turbines are examples.

CONCLUSION

Current generation of innovative technology advances at a greater pace due to cross areas research and development activities. It is the responsibility of food scientists to solve the problem of food safety, food insufficiency, and attempt to contribute towards the improvement of human health. At the same time, more and more attention needs to be focused on the employment of these innovative technologies.

The review is only based on the technologies listed on the technology trade from international sources and ones not listed are not included.

AUTHOR DISCLOSURES

The data base employed is authorized by Sinew Consulting Group Ltd., Taiwan, ROC

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食品領域新技術及其安全

在全球化的過程中，除了商品交易之外，技術交易已成為另一選項。雖然技術交易平台上的技術未必都是新技術，但國際技術交易資料庫仍是一個觀察全球新技術的途徑之一。樞紐科技顧問(股)公司之國際技術交易平台的技術資料庫為此篇引導食品安全討論的案源。在資料庫中，食品製程、功效成分及品管相關技術項目較多。本討論將技術分類為 1)農業原料/成分 2)食品製程/工程 3)食品添加物 4)食品包裝/後勤 5)功效成分 6)雜項等6項分類。每一次分類都有技術案例進行討論，包括基因改造技術、奈米技術、中草藥技術等議題。現今，由於跨領域的研究發展，新技術的開發速度愈來愈快。同時，我們對於這些新技術的引用也需要更多的注意。

關鍵字：技術交易、新技術、技術評估、食品技術、食品安全