



## NANO PRODUCT IN MALAYSIA: A REVIEW OF MALAYSIA HALAL CERTIFICATION

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### Abstract

Nano products are entering the industry including into the halal industry in many sectors. The application of nano product in halal industry that deserve the critical attention are largely in food and beverages industry, consumer goods, pharmaceutical, cosmetic and personal care. This paper start with the definition of nano and halal and then share findings on the available certified halal products that use the term 'nano' and lastly to provide opinion from the Department of Islamic Development Malaysia about the management and certification of nano product in halal industry. This paper mainly shares the relevant law and procedure of halal certification for nano product in Malaysia.

**Keywords**--- Nano product, Nanotechnology; Halal Nano Product; Nano product halal certification; Malaysian Halal Certification.

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### MAIN TEXT

Nanotechnology has become favorite among researchers from multidisciplinary background. This technology that enable the manipulation of material at nano scale lead to wondrous nano product which have moved from laboratory benches to market shelves and e-commerce websites. The evidence of the existence of nano product can be seen from the increasing number of nano product display in numerous nano product inventories. However not all product that use the term 'nano' did actually use nanotechnology. Much of the product are just claim to be nano. Some of the product that is genuinely nano product on the other hand pose uncertain risk towards human and environment. Likewise, the nano product certify as halal in the halal inventory. Most of the halal nano product use the term nano when in fact, they are not invented using nanotechnology. The genuine halal nano product on the other hand might not be safe for consumer. Hence, the issues are on the halal nano product claim and halal nano product safety. This paper will discuss the Malaysia standard and regulation that govern the procedure to certify nano product as halal in accordance with the Malaysia halal certification.

### Definition and concept of Nano, Nanotechnology, Nanomaterial and Nano Product

The prefix 'nano' is derived from the Greek words *nannos*, meaning very short man or dwarf. Nano is very small. This comma, for instance, spans about half a million nanometers (Allhoff, F., Lin, P., & Moore, D. (2009). Some scholars trace the concept of nano mentioned in the Quran (The Holy Quran made specific reference of 'atom' and 'anything smaller than atom' (nano). The word 'zarrah' is used as synonymous of atom can be found in 4:41, 10:61, 34:3, 34:22 and 99:6-8.). It was in 1959 that this concept was made known when Richard Feynman presented a speech entitled "There's Plenty of Room at the Bottom: An Invitation to Enter a New World of Physics". The term 'nanotechnology' was first used by Nario Taniguchi in 1974. In his paper Taniguchi described nanotechnology as the technology that engineer materials at the nanometer level. Since then nanotechnology has continued to evolve in four generations – first generation: passive nanostructures (until 2000), second

generation: active nanostructures (until 2005), third generation: systems of nanosystems (until 2010) and fourth generation: molecular nanosystems (2015-2020) (Roco, M. C. (2011).

It is relevant to share here that the National Nanotechnology Centre (NNC) of Malaysia has defined nanotechnology as the understanding and control of matter at nanoscale dimensions between 1-100 nanometers, forming structures and systems with unique physical, chemical and biological properties that enabled novel applications (Karim, E., & Munir, A. B. 2015).

Nanomaterial exists in a form of chemicals that can be found in the Periodic Table of the elements. Nor Aishah Saidina Amin (2016) mention there are 8 common nanomaterials used which are Silver (Ag), Gold (Au), Iron (Fe), Cadmium (Cd), Titanium Dioxide (TiO<sub>2</sub>), Iron Oxide (Fe<sub>2</sub>O<sub>3</sub>), Carbon Nanotubes (CNT) and Fullerene, a form of Carbon (C). Those chemicals are regarded as nanomaterial when the size ranged between 1-100 nanometer (nm) which will become nano silver (AgNP<sup>1</sup>), nano gold (AuNP<sup>2</sup>) and so on.

Nano products are products that contain or are manufactured using materials in the nanoscale range. At this nanoscale range, they might be stronger or lighter, or, more reactive. This is because they are so small and can be used in different ways than in their larger form (<http://www.nanoandme.org/home>). For example, nano-silver behaves differently from its bulk material (silver) because nano silver release greater amount of silver ions. Nano-silver also has the ability to cross many biological barriers and deliver silver ions efficiently to the surface of bacteria. This makes nano-silver an even more effective antimicrobial than silver (Marambio-Jones, C., & Hoek, E. M. 2010) that leads to various nano product that incorporate nano silver like nano socks, nano shirts and others.

Nano products can be found in broad array of products among other under computing and electronics (better screens, quick

<sup>1</sup> Ag – Silver, NP - Nanoparticle, AgNP – Silver Nanoparticle

<sup>2</sup> Au – Gold, NP – Nanoparticle, AuNP – Gold Nanoparticle

charge battery), textile and clothing (stain-resistant fabrics, anti-bacterial), and construction (stronger with lighter materials).

Despite the unique properties of nanosilver as an extremely effective anti-microbial, this same unique property has created new health and environment risk. A 2010 report identified nanosilver as one of the fifteen emerging issues that could threaten biological diversity (Sutherland, W. J et al. 2011).

Nanosilver can enter the aquatic environment through many routes, e.g. washing of wounds treated with nanosilver plasters, washing machines equipped with nanosilver to purify clothing and laundering of treated fabrics (Benn, T. M., & Westerhoff, P. 2008). Due to the widespread and high use of nanosilver, it will eventually be released into our lakes and streams from municipal and industrial wastewater. This could put aquatic organisms at risk of toxic effects.

The exposure level for consumer of nano product is low, middle or high. To determine the level of exposure, three factors need to be consider. First, the characteristics of the nanomaterial in the consumer product which is whether the nanomaterial was free or fixed inside the consumer product. Second, the application of the nanomaterial in the consumer product which is where it is used and how many people use it. Finally, the exposure route of the nanomaterial which is whether it is via inhalation, skin or ingestion. (Wijnhoven, S. W. P. et al. 2009).

According to most experts, the high exposure to consumer come from nano product under the category of cosmetic and personal care for example sun block cosmetics, oral hygiene products, supplements and health products.

Also rated as high exposure by most expert are nano product such as cleaning products and fuel for motor vehicles. While the low exposure to consumer come from nano product in the form of coatings and lighting for motor vehicles, electronic parts, computers and sporting equipment.

The number of nano product place in the market is increasing but the exact number remain unknown. One of the primary steps in the regulation and governance of nanomaterials can be the development of a database, otherwise known as 'register of nanomaterials' or 'nano-enabled product register'. (Munir, A. B., et al. 2016 )

#### **Definition of Halal**

Halal originates from the Arabic word namely *halla*, *yahillu*, *hillan*, *wahalan* which means allowed or permissible by the Shariah law. The definition of halal according to Trade Description Act 2011, Trade Descriptions (Definition of Halal) Order 2011 is stated in Section 3(1) as food or goods or service that Muslims are permitted to consume or use.

Permitted means does not contain any part of prohibited animal or anything impure or intoxicate or part of human being. Permitted also entails that the food, good and services is safe to be consumed or used as well as must be prepared, processed and manufactured according to Islamic law.

From the definition, it is important to note that one of the criteria to certify food, good or service as halal is that it must be safe and not hazardous to health. Accordingly, the nano product must be safe to be used or consume in order to be certified as halal.

The Trade Description Act was enacted for the purpose of promoting good trade practices by prohibiting false trade descriptions and false or misleading statements, conduct and practices. Section 6 describe trade description as an indication about any goods as having among other certain capacity, size, strength, performance and behavior. According to section 5 it is

an offence if any person who applies a false trade description to any goods.

Hence, manufacturer that claims their product as 'nano' but not of the nature, size, behavior or nanotechnology characteristics, commit a false trade description which is misleading and if convicted could be held liable.

#### **THE AVAILABLE HALAL PRODUCTS THAT USE TERM 'NANO'**

The HALAL Malaysia Official Portal maintain Halal Malaysia Directory that display the product certified halal. The term 'nano' appear as much as (5) for company, (1) for food menu, (14) for product, (54) for cosmetic, (75) for consumer goods, and (12) for international. In total there are 156 halal nano products certified. However, it is uncertain whether all the product certified are nano product or claim to be nano product.

In order to check whether the product is nano product or not, it is relevant to refer to an initiative call NANOVerifyProgramme (NANOVerify Website, <https://www.nanoverify.com.my/>), a voluntary certification programme for products with claims of nano and process using nanotechnology which is initiated by NanoVerifySdn. Bhd (NVSB) in collaboration with SIRIM QAS International. Through this certification process, the presence and quality of nanomaterial based product will be certified to control the false claim of nanotechnology products in the market.

Nano product that are verified are (1) food, (7) filtration media, (3) cleaning solutions, (1) medical devices, (1) electronics, (2) textiles, (4) automotive, and (3) cosmetics. Table 1 below cross refer between the verified nano product by NanoVerify and the halal status in MYHalal Portal.

**Table 1.** Verified nano product and halal status

Category	Verified	Certified Halal
Food	1	1
Filtration Media	7	2
Cleaning Solutions	3	NIL
Medical Devices	1	NIL
Electronics	1	NIL
Textiles	2	NIL
Automotive	4	NIL
Cosmetics	3	3

**NIL:** Item not eligible for halal certification according to Manual for Halal Certification (No.4 Condition for Certification page 15-17)

Looking at the above comparison, out of 156 certified halal nanoproduct, only 6 are verified nano product which is about only 3% of certified halal nano product are genuine nano product. As the nano verify is voluntary initiative, this could be the best explanation why the number of halal nano product which is verified is low. The other possible explanation is, most of the verified nanoproduct are not eligible for halal certification. Apart from that, it is observed that there are more nano product found in the halal portal because the industry are more familiar with halal certification rather than nano verify which only start in 2015.

#### **THE REGULATION THAT GOVERN NANO PRODUCT HALAL CERTIFICATION**

As seen above, there are about 156 halal nano products which can be place under three main categories below. Each category is governed by different set of regulation in table 2 by referring to Manual Procedure (Specific Requirements for Certification in Accordance with Scheme page 24-43) as follow

**Table 2.** Regulation for Halal Nano Products

Category	Regulation
1. Food Product/ Beverages/ Food Supplement;	i. MS1500: 2009 Halal Food – Production, Preparation, Handling and Storage – General Guidelines (Second Revision); ii. Food Act 1983 (Act 281), Food Regulations 1985 and Food Hygiene Regulations 2009; iii. decisions of the National Fatwa Council for Islamic Affairs or Fatwa decreed by the states; iv. other related guidelines and regulations.
2. Consumer Goods;	i. MS2200:2012 BarangGunaan Islam – Bahagian 2: PenggunaanTulang, KulitdanBuluHaiwan – GarisPanduanUmum; ii. decisions of the National Fatwa Council for Islamic Affairs or Fatwa decreed by the states; iii. other related guidelines and regulations.
3. Cosmetic and Personal Care;	i. MS2200: 2008 Consumer Good – Section 1: Cosmetic and Personal Care – General Guidelines; ii. Guidelines for Control of Cosmetic Products in Malaysia, National Pharmaceutical Control Bureau; iii. Guidelines on Cosmetic Good Manufacturing Practice, National Pharmaceutical Control Bureau; iv. decisions of the National Fatwa Council for Islamic Affairs or Fatwa decreed by the states; v. other related guidelines and regulations

#### Food Product/ Beverages/ Food Supplement

From above table, it is important to highlight that the certification of halal food product must comply with not only MS1500: 2009 but as well as the three food regulations. Food product that does not comply with Food Act 1983 will not be certified halal.

The Food Act 1983 prohibit any person from preparing and selling food containing substances injurious to health, food unfit for human consumption and adulterated food. Section 14 prohibits the sale of food not of nature, substance or quality demand. Upon conviction, the offender should be liable to imprisonment for five years or fine or both. Sections 15 and 16 provide that failure to comply with labeling and the prescribed standard of a particular food, manufacturers are liable to three years of imprisonment or fine.

To date, the Ministry of Health does not list nanomaterial as one of the prohibited ingredients. However, the nano food that is proven injurious to health or not of nanotechnology quality has violated Section 13 and 14 and may not get halal certificate.

Section 34 of the Food Act empowers the Ministers with certain statutory powers to make regulations on any related matters to food safety and quality. The Act also empowers the court to order any license to be cancelled and food to be disposed off. This section gives power to the relevant Minister to make regulation related to nano product food safety and quality.

While the Food Act 1983 concerns more with the administration and enforcement of the food law, the standard required for safety and quality are governed by Food Regulations 1985. It regulates food standards such as labeling, nutrition labeling, packaging, date marking, food additives, food hygiene, food import and export, food advertising and accreditation of food laboratories.

Part IV (regulation 9-18E) governs labeling. Regulation 18(1A) prohibits the usage of words like 'medicated', 'tonic', 'health' to indicate grading, quality or superiority like on the food package label unless such description of quality grading conform to those

established by the relevant authorities responsible for such grading; and where such words appear on the label it shall be presumed that the food is in compliance with the requirements established by the relevant authorities in respect of that quality grading.

Regulation 18(7) prohibits any food package label from including the word "organic", "biological", "ecological", "biodynamic" or any other words of the same significance unless the food conforms to the requirements specified in the Malaysian Standard MS 1529: The Production, Processing, Labelling and Marketing of Plant-Based Organically.

This means that word 'nano' cannot be claim or label at food package unless it conforms with the grading quality required by authorities and it shall have that quality. Similarly, the word 'nano' should not be used unless it conforms to the specific standard. It is suggested that specific Malaysian Standard should be imposed on nano food product.

Part V governs food additive and added nutrient. It is important to highlight the newly amended Regulation 20A (Anti-microbial agent). In these Regulations, "antimicrobial agent" means any substance used to preserve food by preventing the growth of microorganisms and subsequent spoilage, including fungi spores, mould and rope inhibitors, or to sterilize polymeric food-contact surfaces. The only permitted anti-microbial agent under the regulation is chlorine dioxide (or chlorine (IV) oxide or chlorine peroxide) in the application of ice for postharvest handling for fish.

Nano silver has been incorporated in food because of anti-microbial effect. For example, nano silver has been incorporated in food container to keep food from being spoiled and also used in a water tank to keep the fish fresh to be imported outside. Therefore, this issue must be attended as soon as possible as nano silver is not listed as permitted anti-microbial agent for food under the regulation.

Part V governs the packages of food. Nanotechnology can be applied to food packaging as well. Regulation 27 reads, "Except as otherwise provided in these Regulations, no person shall import, manufacture, advertise for sale or sell, or use or cause or permit to be used in the preparation, packaging, storage, delivery or exposure of food for sale, any package, appliance, container or vessel which yields or could yield to its contents, any toxic, injurious or tainting substance, or which contributes to the deterioration of the food." Hence, food packaging that use nanomaterial with the potential to cause injury is prohibited.

#### Consumer Good

Item 3 of MS2200:2012 define consumer goods as goods that can be used like cloth, accessories and toys but does not include food, cosmetic or medicine.

Nano product that can fall under this category and are widely available nowadays are cloth like nano shirt, nano socks, nano blanket and so on which incorporate nano silver to enhance anti-microbial effect which keep the textile clean. However, there is no specific standard apply to these products.

Item 4.10 require the consumer goods production to comply with other law. The most relevant law is Consumer Protection Act.

In general terms, the CPA is concerned with providing protection to consumers against misleading and deceptive conduct, false representation and unfair practice, providing implied guarantees in respect of supply of goods or services, providing for product liability in respect of defects and providing adequate remedies in the event of defective goods or inadequate services being supplied to consumers.

**Nano Product claim and the CPA**

The relevant provisions for nano product claim can be found in sections 3, 8, 9, 10 and 18 of Part II of the Act and sections 32 and 34 in Part V.

Advertisement protect consumer from being deceived or mislead by a false advertisement and impose liability on the advertiser. Advertiser that advertise nano product but in fact it is not nano, is possibly guilty of misleading and deceptive conduct.

**Nano Product Safety and the CPA**

Section 19 gives authority to the Minister to make regulations prescribing safety standards in respect of the goods. The safety standard in relation to goods may relate to any or all of the following matters; (a) the performance, composition, contents, manufacture, processing, design, construction, finish or packaging of the goods;(b) the testing of the goods during or after manufacture or processing; (c) the form and content of markings, warnings or instructions to accompany the goods.

Overall, section 19 empower the Minister to come out with the safety standards for goods including nano product either on its own or consult with competent agency and expertise.

**Cosmetic and Personal Care**

Cosmetic and personal care product will get certificate once comply with MS2200: 2008 and the other regulation. The Guidelines for Control of Cosmetic Products in Malaysia is prepared in accordance to the ASEAN Cosmetic Directive. The Government regulates the manufacture, sale and importation of cosmetic products through notification, registration and post-market surveillance.

The company or person placing the product in the market shall ensure that safety assessment has been conducted to ensure that such cosmetic product placed in the market will not cause damage to consumer. In the event of any serious adverse or high incidences of adverse a report to the NPCB shall be lodged. Product also can be recalled due to critical quality defects which might cause health risks to users during and after distribution of the product.

With regards to cosmetic claim, claimed benefits of a cosmetic product shall be justified by substantial evidence and/or by the cosmetic formulation or preparation itself.

This means that nano product (cosmetic) manufacturer has the legal responsibility to make sure that their product will not cause damage to human health, to report about the risk exposed, to recall all their defect cosmetic products and to support their claim that their product is nano with evidence.

**PROCEDURE FOR HALAL NANO PRODUCT CERTIFICATION**

The procedure of Halal product in accordance with Malaysia halal certification scheme is divided into:

- i. Food Product/ Beverages/ Food Supplement;
- ii. Food Premise/ Hotel;
- iii. Consumer Goods;
- iv. Cosmetic and Personal Care;
- v. Slaughterhouse;
- vi. Pharmaceutical; and
- vii. Logistic.

All applications for halal certificate shall be submitted online via MYeHALAL at [www.halal.gov.my](http://www.halal.gov.my). Supporting documents shall be submitted after the application form has been submitted via online within 5 working days. The supporting documents required depend on the scheme. In order for cosmetic product to get halal certificate, the NOT number must be provided. Incomplete application will be automatically rejected by

MYeHALAL. Completed application will receive a letter requesting payment for certification fee.

The procedure to get halal certificate for nano product is currently same with other product. Two applications to register halal nano product were rejected due to incomplete documentation and the issue of claim. The author is unable to share the detail due to confidentiality. This finding show that among the reason halal nano product certification is rejected is due to claim made which is prohibited by the law.

**Opinion from Department of Islamic Development Malaysia**

With regard to nano product claim, the claim that is not allowed depend on the type of product. For food product non permissible claim are those prohibited under the food regulations, for cosmetic product the claim must be justify with evidence as required by the regulation. Only this kind of claim are given attention and scrutiny. Whereas on the issue of product claim to be nano, there is no requirement to verify it.

With regards to nano product safety, it is important for all certified halal product to be safe. Whether a product is safe or not, the department refer with other regulation. For example, when it comes to food, food that is consider 'safe' under the Food Act 1983, would be regarded as 'halal' under the MS1500: 2009. As illustration, if noodle contain dangerous chemicals prohibited by Ministry of Health, it is not safe hence halal certificate will not be issue. As the food regulation has no guideline on nano food product, it is consider as 'safe' as for now hence halal certificate be given.

**Recommendation**

With regards to nano claim, there are two things that need to be verified. First, whether it is nano product and second whether the claim of its function or benefit is true or not. For example, Product X is a nano food container with nano silver that claim can keep your fruit last for one week. This product must first be verified as nano product and then must be able to keep fruit fresh.

With regards to nano safety, more study should be conducted to ascertain whether nano product is safe for consumer. The relevant minister should come out with a guideline or list on what are the nanomaterials that is allowed and not allowed to be used in nano product. With the department will have a direction on how to assess and manage halal nano product certification.

Meanwhile, as the safety of nano product is uncertain, it is best to practice the precautionary principle. Precautionary principle is a strategy to cope with scientific uncertainties in the assessment and management of risks. Idioms like 'look before you leap', 'better safe than sorry', capture some aspect of this wisdom. It allows the government to take action in advance of scientific uncertainties as provided by UNESCO, COMEST, World Commission on the Ethics of Scientific Knowledge and Technology, 2005. This principle emphasize that the government need not wait for the risk to happen for them to take action.

Among action that can be taken is by giving knowledge to the consumer about nano product risk so that they will have informed choice of whether to buy or not to buy as provided in section 23(1) of Consumer Protection Act. Even though the risk of nano product is uncertain in the short and long term, some countries have started cautioned their subject about purchasing nano product. German Federal Environment Agency (UBA) for example, warns consumer to avoid products that contain nanoparticles while the risk to environment remain unknown. The UBA acknowledges that there are significant data gap of risks toward human and environment and until more data is available it advises consumers to avoid nano products in an attempt to minimize risk. Nevertheless, the agency emphasize

that the agency is far from being anti-nano and make recognition of the benefit that nano product could bring to the environment. '*The agency promotes environmental innovations that are possible through the use of nanotechnology, and can provide environmental relief, provided the potential risks to the environment and human health can be valued and avoided*' the UBA said in a statement.

Last but not least, the nanoproduct are coming into the industry under many categories including under the category that is not eligible for halal certification. It is recommended that the excluded item must now be included for halal certification consideration in order to make more halal nano product to be register.

### CONCLUSION

Nano claim issue can be resolve by having a mechanism like verification before certification. In fact, manufacturer that simply claim their product as nano has committed an offence under regulations mentioned above. The mechanism to certify halal nano product that is correct will generate public trust towards halal nano product certified and register in Halal Directory and could be a model for national nano product registry in future.

Nano safety is a technical issue that can be resolve with proper guideline issue by competent authority with competent facilities. Apart from Department of Islamic Development Malaysia and other Ministry, the manufacturer also should bear the burden to ensure only safe nano product be place in the market.

Above all, the nano product may raise the Malaysia Halal Certification requirement to the next level.

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