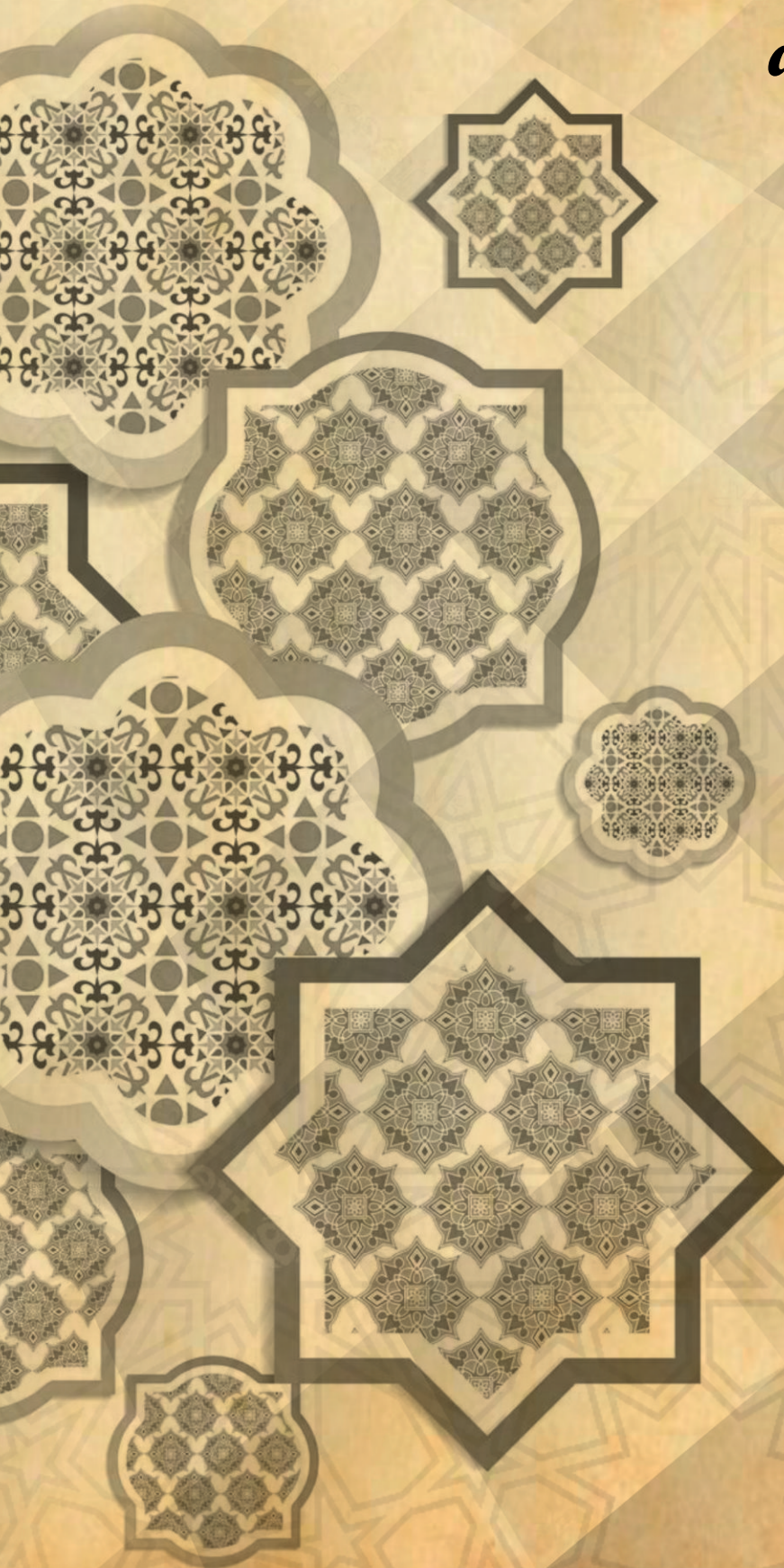


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Foreword

Dear readers,

In front of you is the first issue of the Journal on Halal Quality and Certification, which offers a strengthening of the scientific framework for cooperation in the field of production and certification of halal products.

The scientific and social significance of the Journal is reflected through the collection, presentation and affirmation of scientific, professional and practical achievements in the field of halal quality certification, as well as the production and processing of halal products. At the same time, efforts are being made to improve the connection of the academic community, agricultural producers, industry (food and pharmaceutical) and states institutions. By presenting knowledge and experience in the field of halal quality in the Journal, we aspire to contribute to the development of the quality of halal products as well as certification procedures.

Indirectly, halal quality improves production and economic growth, and in this way can globally affect people's quality of life. This effort should be strengthened by understanding and cooperation among related parties around the world in facing and solving problems that may arise. The Journal is designed to facilitate the needs of academia, researchers, practitioners, policy makers, government and private agencies in discovering and sharing their knowledge and experiences on current and future issues related to Halal quality science.

The members of the scientific council, scientific board and editorial board are eminent scientists and professors with knowledge and experience in the validation of scientific and professional works, and especially knowledge in the field of theory and practice of HALAL QUALITY.

Printed and online edition of the Journal is a contribution to the development and dissemination of scientific thought and research results in the field of halal quality and certification. Thanks to the advancement of technology, we can now live in a convenient environment using databases, modern computers, smart phones, etc. This Journal is available online as well as hard copy. This enables easier, faster and better access to researchers and other interested parties from all over the world. The magazine intends to integrate halal with other disciplines such as theology, food technology, agronomy, veterinary science, medicine, pharmacy, economics, law and others. For this reason, the Journal will deal with topics corresponding to the areas of halal quality certification, such as:

- Halal quality certification and accreditation, status and opportunities for improvement,
- Analytical methods in haram identification,
- Halal in different segments of industrial products,
- Halal nutrition in conditions of a diverse range of products from industrially developed countries,
- Halal tourism and gastronomy,
- Halal and medicine,
- Halal in the pharmaceutical and cosmetic industry,
- Halal, Islamic economy and banking,
- Halal in the context of sustainable technologies and lifestyles,
- Halal quality assurance and management system and,
- Hygiene and sanitation in accordance with Halal.

The journal will publish articles in English, and abstracts additionally in Bosnian.

The Agency for Halal quality certification is the publisher of the Journal, and the co-publishers are the Faculty of Islamic Sciences, the Faculty of Technology Tuzla and the Faculty of Food Technology Osijek. The participation of the SMIIC (Standards and Metrology Institute for Islamic Countries) gives the Journal a special value, which indicates its international importance.

Finally, we would like to express our sincere gratitude to all authors who contributed to this first issue, as well as reviewers and all related parties who made this Journal see the light of day.

Prof. dr. sci. Midhat Jašić, editor-in-chief
Ph. D. Damir Alihodžić, director of the Agency and editor

Predgovor,

Poštovani čitatelji,

Pred Vama je prvi broj Časopisa o halal kvaliteti i certificiranju koji nudi jačanje naučnog okvira za saradnju u području proizvodnje i certificiranja halal proizvoda.

Naučni i društveni značaj Časopisa ogleda se kroz prikupljanje, prezentiranje i afirmiranje naučnih, stručnih i praktičnih dostignuća iz oblasti certificiranja halal kvalitete, kao i proizvodnje i prerade halal proizvoda. Istovremeno se nastoji unaprijediti povezivanje akademske zajednice, poljoprivrednih proizvođača, industrije (prehrambene i farmaceutske) te državnih institucija. Prezentiranjem znanja i iskustva iz oblasti halal kvalitete u časopisu nastoji se doprinijeti razvoju kvalitete halal proizvoda kao i postupaka certificiranja.

Indirektno halal kvalitet poboljšava proizvodnju i ekonomski rast te na taj način može globalno utjecati na kvalitetu života ljudi. Ovaj napor treba biti osnažen razumijevanjem i saradnjom među povezanim stranama diljem svijeta u suočavanju i rješavanju problema koji se mogu pojaviti. Časopis je koncipiran kako bi olakšao potrebe akademske zajednice, istraživača, praktičara, kreatora politika, vladinih i privatnih agencija u otkrivanju i dijeljenju njihovog znanja i iskustava u temi trenutnih i budućih pitanja vezanih uz nauku o halal kvaliteti.

Članovi naučnog savjeta, naučnog odbora i uredništva su eminentni naučnici i profesori sa znanjem i iskustvom u validaciji naučnih i stručnih radova, a posebno znanjem u području teorije i prakse HALAL KVALITETE. Štampanje i on line predstavljanje časopisa je doprinos razvoju i širenju naučne misli i rezultata istraživanja u području halal kvalitete i certificiranja. Zahvaljujući napretku tehnologije, sada možemo živjeti u povoljnom okruženju koristeći baze podataka, moderna računala, pametne telefone itd. Ovaj časopis je dostupan on line, ali i štampanoj kopiji. To omogućava lakši, brži i kvalitetniji pristup istraživačima i drugim zainteresiranim stranama iz cijelog svijeta. Časopis ima namjeru integrirati halal sa ostalim disciplinama kao što su teologija, prehrambena tehnologija, agronomija, veterina, medicina, farmacija, ekonomija, pravo i druge. Zbog toga će se u Časopisu obrađivati tematika u skladu sa područjima certificiranja halal kvalitete kao što su:

- Certifikacija i akreditacija halal kvalitete, status i mogućnosti za poboljšanje,
- Analitičke metode u identifikaciji harama,
- Halal u različitim segmentima industrijskih proizvoda,
- Halal prehrana u uslovima raznovrsne ponude proizvoda iz industrijski razvijenih zemalja.
- Halal turizam i gastronomija,
- Halal i medicina,
- Halal u farmaceutskoj i kozmetičkoj industriji,
- Halal, islamska ekonomija i bankarstvo,
- Halal u kontekstu održivih tehnologija i načina života,
- Sistem osiguranja i upravljanja halal kvalitetom i
- Higijena i sanitacija u skladu sa Halalom.

Časopis će objavljivati radove na engleskom jeziku, a sažeci dodatno na bosanskom.

Agencija za certificiranje halal kvalitete je izdavač časopisa, a suizdavači su Fakultet islamskih nauka, Tehnološki fakultet Tuzla i Prehrambeno-tehnološki fakultet Osijek. Posebnu vrijednost časopisu daje participacija i SMIIC (Standards and Metrology Institute for Islamic Countries) što ukazuje i na međunarodni značaj.

Na kraju, želimo izraziti našu iskrenu zahvalnost svim autorima radova koji su doprinijeli ovom prvom broju, ali i recezentima te svim povezanim stranama koji su učinili da ovaj časopis ugleda svjetlo dana.

*Prof. dr. sc. Midhat Jašić, glavni i odgovorni urednik
Dr. sci. Damir Alihodžić, direktor Agencije i urednik*

JOURNAL OF HALAL QUALITY AND CERTIFICATION

Challenges and Restraints to Halal Market Growth

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Review paper

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ABSTRACT

Keywords:

halal market, Islamic economy, halal boycott, xenophobia.

Halal markets belong to the group of the world's strongest markets. In 2021, the size of the global halal food market is larger than the individual annual GDP sizes of some of the world's most developed countries, and is estimated to grow at a rate of approximately 11%. Companies from Muslim-majority countries, as well as those from non-Muslim countries, are working to become major players in such a growing market. However, the expansion of the halal market carries a potential social conflict arising from two related natures: on the one hand, the struggle for market shares in global production, and on the other hand, the clash of cultures in the market. For now, the economic conflict is muted by the globalist ideology of the free market, but the post-globalist perspective with the possible closure of national markets could awaken that conflict. The second conflict is more pronounced and strongly present in the public discourse of certain Western countries where aggressive anti-halal movements have been developing in recent years. The regular narrative of such movements is expressed by the claim that halal food is a threat to the normal life of Westerners and that by consuming it, non-Muslims will be contaminated by Sharia ideology. These are significant challenges and limitations for the further growth of the halal market. Gathering such information is an important prerequisite for understanding the complexity of market penetration of halal products, as well as for understanding the potential social conflict that is already hampering the long-term and complex dialogue between Islam and the West.

1. Introduction

The discourse on halal markets with all its ideological, geopolitical, economic, psychological and religious considerations has irresistibly entered the world of our time and today. Since the establishment of halal certification was initiated in the late 1970s and early 1980s, the halal industry – covering the production, distribution, storage, circulation, financing, marketing and consumption of halal

products and services – has experienced a fascinating expansion. In the initial phase of its development, the halal market was shaped as a market for halal food, primarily meat, and then progressively covered all aspects of modern human life and globalized to a whole range of products and services. The normative rounding of the halal concept was carried out by establishing new institutions: the Halal Certification Body (HCB), Islamic finance and Islamic marketing.

Over time, halal has grown beyond the scope of cultural, ethical and religious obligations of

Muslims (Power, 2008), and today everyone else prefers the concept of halal due to its clean and safe consumption (Haque et al., 2015; Ghadikolaie, 2016; Izberk-Bilgin & Nakata, 2016; Noor et al., 2016; Selvarajah et al., 2017). This established the halal market as a global phenomenon and a great market potential for the whole world. Many multinational companies have recognized their opportunity in both the local and global markets and are working to become major players in this growing market (Waarden & Dalen, 2011; State of the Global Islamic Economy Report 2018/19). The process of globalization has strongly supported the market penetration and competitiveness of halal products and services. Moreover, we can assert that halal markets have become complementary to the process of globalization. It is therefore not surprising that Joe Regenstein of Cornell University said that "food companies will not be global if they are not halal" (Power & Gatsiounis, 2007). Such expansion has led the halal market to an annual volume of production and turnover of halal products and services that already exceeds the gross domestic product of some of the most developed countries in the world.

However, the expansion of the halal market as a promising emerging market is not a one-way upward process. Despite the visible indicators of the success of the growth dynamics of all sectors of the Islamic economy (Islamic finance, halal food, Muslim-friendly travel, modest fashion, media/recreation, and halal pharmaceuticals /cosmetics), the global growth of the halal economy brings a series of challenges and limitations, which we have divided into two related groups. On the one hand, it is a struggle for market shares in global production, and on the other, a clash of cultures and ethno-religious ideologies at the market. In such a struggle for the primacy of "culture at the market" in some non-Muslim societies, the ideological and cultural boycott, especially of halal food, is strengthening. There is a broad ideological, ethno-national and cultural platform of resistance to the halal production-consumer concept, the most widespread of which is expressed by the claim that halal food is a threat to the normal life of Westerners and that by consuming it, non-Muslims will be contaminated with Sharia ideology. The struggle for market share in global production is turning into an increasingly fierce ethnic and cultural conflict. That has become not only a matter of potential obstacles to the further growth of the halal market, but also of a potential

social conflict that is already hampering the long-term and complex dialogue between Islam and the West.

2. Methodological approach and goal of the research

This research uses primary open published documentary sources (holy books, fatwas, parliamentary debates, databases) and secondary, data in the form of published scientific articles, books, media reports, conference papers and transcripts, interviews and other written forms about all important aspects of penetration and boycott of the halal market.

The research is the result of a discursive analysis that systematizes different approaches to the perception of the state and perspective of halal market penetration. The aim of this work is to look at the need to systematize information and face cultural, ideological and economic challenges and limitations of the existence and expansion of the halal market in multicultural societies. This kind of information is an important predictor of understanding the complexity of the global penetration of halal products, and even a kind of early warning of possible sharper social conflicts.

3. Propulsive growth - the potential of the global halal market

Halal markets belong to the group of the world's strongest markets. Latest *Global Islamic Economy Report 2021/2022* states that the halal market is worth USD 2,221.3 trillion and is larger than the individual annual GDP sizes of Italy, Canada, Russia and Spain, and is estimated to be growing at a rate of about 11%. Its growth at the global level is stable and continuous, without major disruptions and recessions, and is significantly more stable and stronger than the market of conventional economies. The growth of the halal market is even more attractive compared to the slow growth of Western economies. With over 18% of the total world market and the fastest growing market demand, the halal food and beverage market has all the prerequisites to become one of the most influential markets in the next decade. At the same time, other sectors of the Islamic economy are growing: some estimates from a few years ago calculated that the halal tourism sector will account for about 14% of global travel expenses by 2022. (Mattison, 2018).

Also, the Islamic economy proved to be significantly more resistant to the devastating effects of the coronavirus on the economy (Susilawati, 2020). Benamraouni (2021) shows that Islamic finance and economics provide a range of solutions to the economic effects of COVID-19 through its key investment principles and mechanisms, including profit and loss sharing, taka-ful and waqf. In contrast to the drastic drop in economic activities during the Covid-19 pandemic in 2020. (the world economy fell by approx. 5%, and in the Eurozone by as much as 6.6%), the market attractiveness of halal food kept its consumption at an almost unchanged level. Let's recall that then, private consumption, which is the main driver of the growth of the American economy, experienced the biggest drop since the 1980s, while the consumption of halal food decreased by only 0.2 percent. After 2020., another strong expansion of the halal market followed. In 2022, the turnover of the halal market exceeded the pre-pandemic 2019 (in which the turnover of the halal market was USD 2.02 trillion) (ISA, February 23, 2023), thus by USD 0.20 trillion or by 9.09%. Interpolating the trends from 2021 and 2022, IMARC Group expects the halal food market to reach USD 4,177.3 trillion by 2028 with an expected growth rate (CAGR) of approximately 11% during 2023-2028. (*Market Research Report, 2023*). The expansion is even stronger than what was predicted in the past years. Statistical calculations

(*State of the Global Islamic Economy, Report 2018/2019*) predict that compared to 2017., the halal food market will grow at an annual rate of 6.1 percent and reach USD 1.9 trillion by 2023., while in reality the situation shows that this amount has already been significantly exceeded in 2022., by USD 0.30 trillion.

With the inclusion of Islamic finance (3.6 trillion USD in 2022.), the Islamic economy grows to over 5.8 trillion USD. The global financial crisis of 2008 gave a strong impetus to Islamic finances, with Islamic finances being promoted as a serious challenge to the restructuring of the crisis-prone global financial system. Investments in companies relevant to the Islamic economy increased by 118% from USD 11.8 billion in 2019/20. to USD 25.7 billion in 2020/21. About 66.4% of total investments in companies relevant to the Islamic economy are covered by Islamic financing transactions. The figures include corporate mergers and acquisitions, venture capital investments in technology start-ups and private equity investments (*State of Global Islamic Economy Report 2022*). The global market capacity of the halal economy of individual countries is measured by the Global Islamic Economy Indicator (GIEI). Table 1 provides a broader overview of the indicators of the global halal market for the first 15 countries, starting with GIEI, as well as indicators of the individual economic sectors belonging to the Islamic economy.

Table 1. Indicator score breakdown for Top ranking countries 2020/2021

	GIEI	Islamic Finance	Halal food	Muslim-Friendly Travel	Modest Fashion	Pharma and Cosmetics	Media and Recreation
1. Malaysia	207.2	426.9	123.4	193.5	46.0	83.0	97.4
2. Saudi Arabia	97.8	218.6	56.6	69.2	19.3	34.3	29.7
3. UAE	90.2	114.6	63.3	78.6	171.8	53.6	63.8
4. Indonesia	68.5	91.0	71.1	58.0	68.0	46.3	26.0
5. Turkey	67.3	51.0	69.8	106.7	95.1	55.0	53.5
6. Bahrain	66.7	121.9	44.5	89.3	18.6	29.4	30.1
7. Singapore	65.0	45.0	57.0	107.1	48.3	107.9	78.5
8. Kuwait	62.1	115.5	43.1	69.0	17.5	29.6	29.2
9. Iran	56.0	90.3	48.1	52.1	25.4	42.3	24.9
10. Jordan	51.8	72.1	51.3	58.4	19.3	44.6	25.7
11. Oman	47.8	74.5	46.1	43.2	20.2	26.9	25.9
12. Qatar	46.9	73.4	43.4	40.1	21.6	26.2	30.8
13. United Kingdom	46.1	49.0	47.4	31.4	41.9	45.2	52.9
14. Kazakhstan	45.2	46.0	59.2	60.8	26.6	22.7	26.4
15. Pakistan	44.9	65.7	48.3	38.7	26.4	30.9	11.0

Source: DinarStandard 2022 (DinarStandard uz potporu Dubai Economy and Turizam (DET)).

Compared to the indicators in the previous eight annual reports, *The Global Islamic Economy Report 2022* reveals a strong dynamic of the expansion of the Islamic economy. On the one

hand, the dynamics of the sector, especially in halal food, Islamic finances and FinTech. On the other hand, through the new positioning of the most successful countries in terms of the

development of the Islamic economy, which until now consisted exclusively of Muslim countries. The UK is in the top 15 countries now, and in some sectors, in the top 10 countries are Italy and France in Modest Fashion, and China, UK, Belgium and Germany in Media and Recreation.

4. Ideological and cultural conflict - limitations to the growth of the halal market

By opening space for the meeting of different national and cultural environments, globalization brings peace and unrest at the same time, as we can witness in the example of the rivalry between Islamically defined halal and non-halal concepts at the global market. Against the belief of numerous Islamic scholars that the halal concept is "not a purely religious issue, but a lifestyle" and a "symbol of quality and safety" stands the ideological-political and culturally aggressive boycott of halal by certain political, cultural, ethnic, religious and academic structures in non-Muslim societies (cf. Azam & Abdullah, 2020.). In the global framework, this rejection of the halal concept is significantly less than the interest in the consumption of halal products and services. Moreover, some of the non-Muslim countries in which anti-halal forces appear are at the same time countries with a growing consumption of halal products and with a significant number of companies that implement halal certification of their products (UK, France, Belgium, Australia, India). The UK is on the list of 15 countries with the highest GIEI (see table 1), while France and Australia are among the world's largest exporters of halal meat. France is also among the first countries in Islamic Modest Fashion, and Belgium is among the first countries in Islamic Media and Recreation. (see: *State of the Global Islamic Economy Report 2022.*)

This dichotomy of non-Muslim societies according to the halal concept was explained in a recent study (Wilkins, Mohsin, Shams, Pérez, 2019), which found that "consumer cosmopolitanism and non-Muslim religious identity were found to be positively related to halal product judgment", while "consumer ethnocentrism and national identification were negatively related to halal product judgment." Therefore, the enormous expansion of the halal market is fraught with a multitude of ideological-political and economic conflicts and cultural differences. The halal market, therefore, carries a potential social conflict that is ultimately of a twofold nature: on the one hand, the struggle for

market shares in global and local production and trade, and on the other hand, as a clash of cultures at the market, and therefore religion as an integral part of culture. Namely, the conflict of economic interests and the conflict of cultures interpenetrate each other, thus expressing their predictive potential.

In the market battle, halal products are leading a successful race for a share of the global economy. According to the growth indicators, this market is one of the fastest growing industries, which worries the competitive (production, trade, traditional-cultural) positioning of products and services outside of halal certified products and services. Waarden & Dalen (2011) attributed the emergence of anti-halal campaigns to the rapid expansion of the halal food market, which led to the entry of multinational and international companies into the halal market. In particular, the growing demand at the halal market is stabilized by the certification logo, which is a key symbolic factor in strengthening consumer confidence in halal products and services. Halal regulation has been generously accepted by many Western and Indian large food industry companies whose founders and owners are not Muslims because it brings them huge profits. Halal food items are also gaining popularity among non-Muslim consumers as they have evolved from an identifying mark of religious observance to an assurance of a healthy lifestyle. Therefore, compared to non-halal products, halal products are presented as unique examples of sui generis real differentiation and complete price inelasticity, which is why they have full competitive protection. This differentiation of halal products allows manufacturers to implement a pricing strategy independent of competition based on consumer preferences. Competitive displacement of halal products is almost impossible, because the competitive positioning of non-halal products cannot be guided by any business strategy. The only possible way of competitive struggle and market displacement of halal products is non-economic - by violently promoting consumer ethnocentrism and national identification through anti-halal conspiracy theories.

On an apparent level, the nature of a purely economic conflict has been muted for now by the globalist ideology of the free market, but a post-globalist perspective with the eventual closure of national markets could reawaken that conflict. In this case, there are two scenarios that could limit the expansion of the halal market. The first comes with the reduction of globalization, which

strengthens nation-states and thus a more closed cultural view of the world and way of life. The second comes with a possible pessimistic scenario of not meeting sustainable development goals due to unbridled greenhouse gas emissions (Lenzen et al., 2018). Then countries would intensify their competition with each other, moving towards national security and securing their own food supplies, which would greatly limit the importation of halal food into non-Muslim societies. The economic dimension of this discourse is the Islamic economy as a whole. For critics, Islamic economics is driven by a "cultural identity" developed by Islamists in the 20th century, taking the basic prescriptions from Sharia, and systematizing them for the purpose of building a functionally ethically desirable economic system (Roy, 2015). Also, to present a coherent economic scientific discipline imitating conventional economics by embellishing it with references from the Qur'an and Sunnah (Kahn, 2013, 2018). Khan (2019), in addition, denied the possibility of Islamic economics becoming a social science until the methodological assumptions of the development of Islamic economic thought are clarified, since Islamic economists have not uniquely resolved several dilemmas about religion, Islamic rights, conventional economics, the content of Islamic economics, current practices of Islamic finances, etc. In such a critical context, the thesis is that the actualization of the halal certificate actually aims to hide the religious sanctuary of Islamic economics. The Halal concept is an important merit of the criticism of Islamic economics. Along with the strong expansion, the halal concept is also perceived as a focal point of ethnic-religious and economic competition. While in Islamic countries there is no problem of general acceptance of halal versus haram products for Muslims, the market for halal products is perceived in some political and cultural circles as a strong cultural Islamic intrusion into non-Muslim societies.

In the milieu of Western societies, conflicts of business interests spill over into the cultural domain, which results in the ideologization of identity, political debates and the escalation of conflicts in which the fundamental cultural and ideological values and customs of "others" are considered threatening and problematic (Funk & Said, 2004). The culture of "others" is embodied in halal certified products. As "culture manifests itself in the marketplace," "the marketplace has now become a focus of cultural, religious, and ethnic competition in several countries,"

generating fierce conflicts for the protection of cultural values and subjecting it to a "culture war" (Morgan and Sulong, 2021; Bowen, 2021). This case of conflict is strongly present in the public discourse of certain Western countries, which is what the theory of religious conflicts speaks about.

Many authors complete the picture of opposition to halal by openly considering renewed Islamophobia (Hurfurt, 2014; Ruiz-Beyarano, 2017; Whitham, 2021; Louati & Syeda, 2022). The old phenomenon of Islamophobia, which views Islam as a backward religion incompatible with Western values of democracy, freedom and gender equality, takes a new form by halting the growth of the global halal market and the Islamic economy as a whole (Ruiz-Beyano, 2017). Campaigns against halal have been implemented in some countries through court processes and parliamentary debates, notably in Australia (Etri & Yucel, 2016) and the Netherlands (Jung, 2022). In the case of ideological-political confrontation, accusations are made that the halal concept helps the penetration of creeping Islam, which suppresses the national and cultural identity of non-Muslim societies, and, in a stricter form, that the purchase of halal products is used to finance Islamic terrorism. In the second case, the avoidance of halal products is carried out for religious reasons, since some religions (Sikhism and Hinduism) expressly forbid the use of halal meat. When the American fast-food chain McDonald's announced in 2019 that it was serving only halal meat products in India, Hindu Jhatka defenders heatedly debated whether all customers, regardless of their religious beliefs, should be "forced to eat halal products" and objected to that civil freedom of choice ((Paranjape, 13th June 2020).

5. Discussion: Xenophobia versus halal market - focus thematic blocks

With the boycott of the halal market, xenophobia towards Muslims rounded off its global trend, which, along with its traditional roots in Western societies, is now affecting India and Australia. More recently, xenophobic opposition to Muslims has highlighted dress codes, migrants and the halal market. These topics are also the subject of major debates in legislatures across the West (cf. Zauddin, Jordi & Scot, 2019). In the rest of the text, we will focus only on those forms of xenophobia that imply ethnocentric attitudes towards halal products as a consumer preference. "Protection of the consumers' current situation"

focused on the question of culture (Robinson & Zill, 1997) is one of the three basic dimensions of the CYMYS scale that measures the structure of cosmopolitanism versus xenophobia (see in: Altintas, et al., 2013) and is therefore quite legitimate a methodological tool for examining the xenophobic attitude towards the halal market. We classified the most common positions of the protagonists of xenophobic opposition to the preferences of halal consumers in the following thematic blocks:

(1) Xenophobic attitude: By consuming halal food, non-Muslims will be contaminated with Sharia ideology, and the traditionally Judeo-Christian culture will be "Islamized"! Such views have been discussed in a number of papers (Hussein, April 15, 2015; Ryan, January 21, 2015; Hirschman & Touzani, 2016; Azam & Abdullah, 2020; Jung, 2022). Similar prejudices are directed towards halal tourism (Marbun, 2020). Communities of right-wing movements participate in the action of resistance against halal-certified products, most often through online groups, mainly in Australia, France and India, such as Boycott Halal, Halal Choices, Non Halal, Society of Australia, anti-Halal Facebook group, Opindia, etc. There are also numerous mirror Facebook pages (Boycott Halal UK, Boycott Halal in Europe, Boycott Halal in Canada, etc.). A common narrative of such boycott movements is expressed by accusations that halal food is a threat to the normal life and cultural identity of Westerners. One of the many anti-halal actions, which the Austrian newspaper *Der Standard* exposes as xenophobic, reads: some German supermarket chains that sell halal meat came under attack from the creators of the Halal Challenge, that is, their call to put pork products on halal products; "to get the desired food, devout Muslims would then have to touch pork" (*Der Standard*, March 31, 2016). However, among the harshest xenophobic attitudes towards the halal market and Muslims is the following: "If we can smash halal certification..., we will put a big hole in the power grab of the Islamic Movement. Parallel to this, we need a total ban on Islamic immigration and the Niqab/Burqa and Sharia Law. We have to continue the struggle to ban the building of mosques. (Ivarson, *Boycotthalal*, Australia, Nov 2014, cited by: Hirschman & Touzani, 2016: 23).

Against xenophobia and consumer ethnocentrism: Research on consumer cosmopolitanism (Altintas, Bahar, Kurtulmusaglu, Kaufmann, Reudiger, Harcar,

Gundogan, 2013) shows that: (a) foreign products (in our case, halal products) do not culturally colonize a country, (b) that foreign brands and products do not cause any cultural erosion, (c) foreign goods do not effect life styles, they should be sold in domestic markets, and they are not a threatening factor, they must be viewed without bias, the consumption of foreign products may make the consumer happy.

(2) Xenophobic Attitude: Muslim Halal Food Sales Supporting Terrorism! Islamic finances are more susceptible to abuse by money launderers! Such views are discussed in numerous works, including: Braun & Clarke (2006, 2019), Banna (2011), Wenlei (11 November 2014), Wendy (24 November 2014), Corey (12 May 2015), ABC News Australia (14 April 2015), Esposito and Inner, editors (2019), Jung (2022). Through media sources (e.g. Akt News, during April 2022) disinformation is being spread, along with slandering Muslim companies that they are connected to terrorism. In the same context, economic migrants (mainly Syrian refugees) are criminalized because they represent a great risk for the democratic foundations of European social peace systems. Critics of halal products oppose the "obligation of halal for everyone else", denouncing the cost of halal certification for the delivery of halal-certified goods as a religious tax imposed on all consumers. Worryingly, the Australian church says, "taxpayers are funding the enforcement of Islamic Sharia law through local government," constructing the most damning qualification for the halal industry as "economic and financial jihad" against non-Muslim societies and the "Islamization of Australia" (Hazarika, 4 April 2022; Janson, media portal of Australian Christians).

Contra xenophobia: Several court processes in Australia and UK and parliamentary debates in the Netherlands have shown the absurdity of linking the halal concept to terrorism (Braun and Clarke 2006, 2019; Hirschman, 2016; Etri and Yucel, 2016; Jung, 2022). Of the several baseless accusations, mention those in Australia during 2014 when, following an extensive police investigation, the daily newspaper *ABC News* (April 13, 2015) reported: "A spokesperson for the Australian Transaction Reporting and Analysis Center (AUSTRAC) - the governing body that oversees money laundering and terrorism - he told Fact Check that there is no information that would indicate a connection with the financing of terrorism through fees for halal

certification." In addition, Islamic banks are not allowed to have transactions that are considered haram (businesses dealing with pornography, alcohol, gambling, pork products, etc.), and have to be very cautious with respect to their clients, making sure that their funding sources are not resulting from criminal or non Shariah-compliant activities. Likewise, Islamic banks are required, in addition to standard audits, to rely on a Shariah board that would review and approve financial practices and activities for compliance with Islamic principles. Such reviews increase the probability of identifying any criminally operated accounts. This exclusive compliance characteristic of Islamic finances should be recognized as a credible prevention from terrorist financing and money laundering.

(3) Xenophobic attitude: Halal slaughter (although in the same context, kosher slaughter is rarely mentioned) is barbaric, cruel and unsanitary! It causes great pain to animals! Such accusations and counter-arguments have been discussed by a large number of authors, among others: Maffei (May 2, 2012); Wendy (24 November 2014), Hirschman, Elizabeth C.; Touzani, Mourad (2016), Fuseini, Knowles, Hadley, Swotton (2016), Hamdam (2017); Riaz and all (2021), Haritha (April 5, 2022). Ethnocentric writers and animal rights activists in Western societies advocate banning halal slaughter, which has been done in Poland, Switzerland, Norway and Denmark. Such arguments are based on claims of animal suffering without stunning in halal slaughter. Some authors believe that opposition to halal (and kosher) slaughter reflects anti-Semitic prejudices, which reached their peak during the Nazi movement. At that time, one of the Nazi propaganda films from 1933 (entitled *Der ewerige Jude*) completely distorted kosher slaughter, depicting it as beating animals to exhaustion for pleasure (Handam, 2017).

Contra xenophobia: According to Temple Grandin, Animal Sciences Professor and Advocate, at Colorado State University, if done properly, religious ritual slaughter is as humane as good conventional slaughter methods. A study by W. Shultz at Hanover University in Germany found that pain reactions of cattle to captive bolt stunning were more intense than the pain caused by Halal incision (ISA, Aug 5, 2021). Let us add that stunning can objectively be considered halal if it causes unconsciousness without causing death (Nakyinsige et al, 2013). Namely, several

mandatory procedures in handling the animal before and during slaughter break the myth of the barbarism of halal slaughter and speak of handling the animal in a humane and hygienic way (Maffei, 2012; Aghwan, et. all): (a) Provision of bio-food, clean air and a spacious area for animals to stay, (b) Before slaughter, the animal is calmed down - petted and given a little water, (c) Live animals must not see or look at those that have been slaughtered, as this would frighten them and make them nervous, (d) Animals must be slaughtered quickly with a sharp knife so that the animal does not suffer (the animal quickly loses consciousness, this allows the heart to continue pumping blood and drains the animal of blood). Halal bleeding, when carried out in accordance with recommended animal welfare procedures, will not only maintain the quality and wholesomeness of meat but could also potentially reduce suffering and pain, (e) It is forbidden to hit or shoot the animal, (f) "God's name should be recited over the animal just before slaughter, as the sacrifice is in His name and no other and only He has the right to legislate the taking of life." (g) Food is blessed and sacrificed for consumption, not for throwing away. Thus, Islam teaches zero tolerance to all forms of animal abuse during the supply chain for the production of meat (Farouk, Pufpaff & Amir (2016).

(4) Xenophobic attitude: The Halal concept is a threat to national ways of food preparation! Halal food is treated as an imposition and discrimination against domestic food, primarily meat. In France and the United Kingdom, this was witnessed by a sharp polemic at the moment when some fast food chains (Quick in France, McDonald's in Great Britain) accepted halal certification and were criticized for abandoning domestic values. Moreover, the halal menu was accused of "becoming a threat to the very essence of French republican ideals." As a counterbalance to the halal menu, the French media developed "defensive gastronationalism" as a term that speaks of the "political use of food and the way of eating," reaffirming "national socio-economic boundaries." Gastronationalism thus grew into a political tool for strengthening French identity within national borders, using everyday food, thereby drawing the boundaries of who is French (Wright & Annes, 2013). Such policies even accuse the concept of halal as an ideological platform for "destroying French freedom and republican autonomy", while at the same time "Le Pen's statements demand that secularism

extends not only to the division between church and state, but also to the division between mosques and restaurants." In the same context, it is claimed that halal is not only an innocent term for religiously slaughtered meat, but also a symbol of an attack on French moral and cultural values, which have throughout history been articulated not only in the matrix of rights, freedom and republicanism, but also in their presence in the food itself (Mukherjee, 2014).

Contra xenophobia: Ethnocentric attitudes ignore the fact that halal food is in accordance with the recommendations of modern healthy and safe nutrition guidelines, so it is also attractive to non-Muslims (Bonne, Vormeir, Bergeaud-Blackler, Verbeke, 2007; Burgmann, 2007; Bonne & Verbeke, 2008); Renai, Mohammed, Shamsudin, 2012; Vloreen Nity Mathew et al, 2014; Ismail, Nasiruddin, Nur Syafiqah (2017), i.e. that it implies attributes of quality, purity, environmental responsibility and social justice such as Fair Trade, Bio and Organic in the US and Europe (Turaeva and Brose, 2020).

(5) Xenophobic attitude: The Halal concept is a threat to the development of certain national food industries in non-Muslim countries! The discourse on the threat to national economies is present in Australia and India. Online platforms are particularly active in Australia. For example, Halal Choice talks about discrimination against workers, and Boycott Halal says: "We aim to support our country's economy by seeking out and buying traditional products (according to: Hirschman, 2016; Etri and Yucel, 2016). Hindu Janjagruti Samiti President Ramesh Shinde (2018; 2020; 2022) presents the halal economy as a "parallel economy" that is a threat to the Indian economy and can even "bring down the country's economy." In the same context, halal-certified companies are accused of hiring only Muslims, discriminating against non-Muslims (OpIndia, May 14, 2020). Also, Shinde opposes the penetration of halal meat consumption among Indian communities (many state institutions, according to him, award contracts only to those who serve halal meat) because this destroys the domestic non-halal meat industry, so "thousands of poor Hindu butchers have been ruined" (Shinde, 2020).

Contra xenophobia: There is no rational evidence that the halal industry is destroying the economies of non-Muslim countries. Moreover, the existence of halal products can only contribute to the development of the country.

Surveys of Muslim respondents (Strauss and Juster, 2021) show that discrimination in the employment process actually affects Muslims more, especially Muslim women, given the prejudices of some employers about wearing the hijab. Among the results of the research is one that talks about the frequent existence of segregation of Muslims in the workplace and lower chances for development and career advancement. Research (Susilawati, 2020; Liala, Rusydina, As-Salafijah, 2021) shows that several sectors of the halal economy have mitigated the impact of the corona crisis and are significantly more resilient than similar sectors of the conventional economy (especially Islamic finances, followed by halal food and fashion in the halal sector).

One of the final consequences of the described halal boycott, which is primarily important for understanding the development of the halal market, is the deterring of companies in non-Muslim societies from seeking halal certification, and consumers from buying halal certified products. At the same level, there is support for companies that refuse halal certification. Due to fear of condemnation, some companies have had to abandon transactions with halal-certified companies or have had to remove the halal logo from their products, especially in Australia, India and France, and to a lesser extent in Denmark, Belgium, Canada, New Zealand, the United Kingdom and United States (Emery, 21 January 2015; Hirschman and Touzani, 2016; The Print, 8 April 2022).

6. Conclusion

We have indicated that the Halal industry is one of the fastest growing industries in the world. There is every possibility that the growth trend of the halal market will continue, but it is an open question whether this growth will move in accordance with the optimistic expectations created in reports and studies on halal markets. Contrary to the belief of many Islamic scholars that the halal concept is "not a purely religious issue, but a lifestyle" and "a symbol of quality and safety" - which makes halal products attractive to the non-Muslim population as well - there is an ideological-political, cultural and economic boycott of halal in parts of some non-Muslim countries.

The expansion of the halal market carries a potential social conflict, which is of a double nature: on the one hand, the struggle for market

shares in global production, and on the other, as a clash of cultures at the market. The nature of a purely economic conflict is for now muted by the globalist ideology of the free market, but a post-globalist perspective with the eventual closure of national markets could awaken this conflict. The second conflict is more pronounced and strongly present in the public discourse of certain Western countries where anti-halal movements have been developing in recent years. The reasons for concern are increasingly visible: the emergence of consumer ethnocentrism and national identification are negatively related to the evaluation of halal products. The oppositions are numerous, and among them stand out those with an ideological-political and cultural-religious background. In the first case, xenophobic attitudes towards the halal concept are actualized, that it promotes the penetration of creeping Islam that suppresses the national and cultural identity of non-Muslim societies, and in a more severe form, that the purchase of halal products is used for financing Islamic terrorism. Such oppositions also intensify at the local level: halal slaughter of animals is qualified as cruel, and Western companies with halal certification for slaughter are often denounced as betraying the national and cultural identity of their countries. In addition to cultural threats, Muslim companies are directly accused of "economic and financial jihad".

In this paper, we draw attention to the possible limitations of further penetration of the halal market, especially the consumption of halal food. We advocate a more comprehensive approach to the challenges of the halal food industry boycott movement. The aim of this paper is to refer to the need to systematize information on the challenges and limitations of the existence and expansion of the halal market. Various halal bans, along with negative stories about halal food in the media, are a warning to the global halal industry. This kind of information is an important predictor of understanding the complexity of market penetration of halal products, and even a kind of early warning of potential sharper conflicts.

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Challenges and Restraints to Halal Market Growth

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Pregledni rad

PODACI O RADU

SAŽETAK

Ključne riječi:

*halal tržište,
islamska ekonomija,
halal bojkot,
ksenofobija*

Halal tržište spada u grupu najjačih svjetskih tržišta. U 2021. godini, veličina globalnog tržišta halal hrane veća je od pojedinačnih veličina BDP-a Italije, Kanade, Rusije i Španije, a prema procjenama raste po stopi od oko 11%. Kompanije iz zemalja sa velikom ili ukupnom muslimanskom populacijom, kao i one nemuslimanske, rade na tome da postanu glavni igrači na tako rastućem tržištu. Međutim, ekspanzija halal tržišta nosi potencijalni društveni sukob koji potiče iz dvije povezane prirode: s jedne strane, borbe za tržišne udjele u globalnoj proizvodnji, a s druge, kao sukoba kultura na tržištu. Priroda čisto ekonomskog sukoba je za sada prigušena globalističkom ideologijom slobodnog tržišta, ali postglobalistička perspektiva sa konačnim zatvaranjem nacionalnih tržišta mogla bi probuditi ovaj sukob. Drugi sukob je izraženiji i snažno je prisutan u javnom diskursu pojedinih zapadnih zemalja u kojima se posljednjih godina razvijaju agresivni antihalal pokreti. Uobičajeni narativ ovakvih pokreta izražen je tvrdnjom da halal hrana predstavlja prijetnju normalnom životu zapadnjaka i da će je konzumiranjem nemuslimani kontaminirati šerijatskom ideologijom. Ovo su značajni izazovi i ograničenja za dalji rast halal tržišta. Prikupljanje takvih informacija važan je preduvjet za razumijevanje složenosti prodora halal proizvoda na tržište, kao i za razumijevanje potencijalnog društvenog sukoba koji već komplikuje dugotrajan i složen dijalog između islama i Zapada.

JOURNAL OF HALAL QUALITY AND CERTIFICATION

Halalopathy: Integrating Halal Pharmaceuticals for Holistic Healing

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ABSTRACT

Introduction: Halalopathy is a novel approach to therapeutic medicine that emphasizes the compatibility between medication and beliefs/lifestyles of patients.

Aim of Work: To investigate the compatibility between medication and beliefs/lifestyles of patients in the context of Halal lifestyle, and to understand the concept of Halalopathy in terms of entropy and potential energy.

Material and Methods: A literature search, logical thinking, idea comparison, analogy thinking, data analysis and conceptual idea generation were used to gather information, identify patterns, draw parallels, test hypotheses and generate new ideas to contribute to the current body of knowledge and identify potential areas for future research.

Results and Discussion: The research found that compatibility between medication and patients' beliefs/lifestyles results in increased trust in treatment, stimulation of the placebo effect and a harmonious relationship between the mind and medication. Halalopathic medicine, a holistic approach that incorporates material, human, moral and spiritual values, is based on the principles of entropy and potential energy. This approach improves prevention and recovery by understanding the body in terms of entropy and potential energy and using this understanding to deliver the most appropriate treatment for each individual patient.

Conclusion: Halalopathy represents a new therapeutic concept that aims to enhance the compatibility between human's belief/lifestyle and therapeutic drugs, leading to a more effective treatment. The research demonstrates the importance of evaluating ingredients and closely monitoring production processes to ensure adherence to Halal guidelines in order to achieve compatibility and more effective treatment.

1. Introduction

The human body is a complex organism that requires proper care and attention in order to perform optimally. The maintenance of good health is an integral aspect of human life and is essential for leading a fulfilling existence and contributing to the growth and development of society. The relationship between health, food, and security is widely recognized as important

in determining the standard of living for individuals and societies (Jaron, 2009).

Health is defined as a state of physical and mental well-being and is considered a fundamental human right that must be protected and maintained (Krennerich et al. 2017). Food is an important component of survival, while security provides peace, happiness and serenity. On the other hand, illness is a temporary

condition in which the body is unable to perform its functions effectively. In some cases, the immune system is weak or treatment is inappropriate, worsening the symptoms of a disease. Recent medical advancements have led to the development of personalized therapy, and extensively in the hopes of offering more effective and efficient treatments for various health conditions (Wu et al. 2022).

Halalopathy is a comprehensive and synergistic form of medicine that combines the aspects of physical, mental, and spiritual health (Alzeer, 2018b, 2019, 2021a). This unique approach to healthcare is about promoting harmony and incorporating lifestyles, or religious beliefs into the treatment of disease (LeDoux et al. 2019). The focus of Halalopathic medicine is to prevent and treat disease by strengthening the body's immune system and promoting a harmonious balance between a person's lifestyle, values, and energy (Alzeer, 2023). However, more research needs to be conducted to confirm its potential and effectiveness before Halalopathic medicine can be widely adopted. In turn, this research will help to provide guidelines for implementation in clinical practice. According to Halalopathy, all aspects of drug preparation must be in line with lifestyle preferences. In the case of the Halal lifestyle, Halal and Tayyib principles prescribing the origin of ingredients, their safety and toxicity, manufacturing processes, and packaging must be properly implemented (Norazmi, 2015). This is highly essential to establish a link between medicines and lifestyle, which in turn creates a compatible system that plays an important role in activating the potential for prevention and healing.

2. The Significance of Tranquillity, Positive Expression, and Healing Substances in Islamic healthcare

The field of medicine has come a long way in recent years, with developments in psychological, medical and physiological research providing a deeper understanding of health and illness (Schneiderman, 2005). This research has shown that health and illness are not just determined by biological factors, but also by behavioural and social elements. For example, stress, lifestyle choices, and social circumstances can all impact an individual's health.

The concept of healing is also a central theme in Islam, which places a strong emphasis on

new frontier in medical treatment that focuses on providing the correct remedy for each individual, at the correct dose, and at the right moment (Panovska, 2022). This approach is being researched.

maintaining a positive outlook and using natural healing substances to promote well-being. In addition, Islam recognizes that stress (Zaman et al. 2022), anxiety, and other negative emotions can take a toll on one's health and therefore encourages individuals to cultivate a peaceful and tranquil state of mind to support physical and mental healing (Alzeer, 2022b). Tranquillity refers to a state of mind characterized by peace and absence of fear and grief (Herzog, 1998). This state is more likely to be achieved in environments that are calm and quiet. Chronic fear and grief can have negative effects on an individual's health and well-being (Westoby et al. 2022). The Qur'an recognizes this and takes a strong stance against such negative emotions. It promotes positivity, optimism, and peacefulness as a means of promoting good health.

The Qur'an explicitly states that fear should not be directed toward other people or worldly things, but instead towards God. It states, "It is only Satan who frightens you with his followers. So, have no fear of them, but fear Me, if you are indeed believers" (Al-Imran 3: 175). The Qur'an also promises that those who remain steadfast in their faith and follow God's guidance will receive good news and a sense of peace and tranquillity. The Qur'an states, "When those who say 'Our Lord is Allah' and then act with integrity, the angels will descend upon them, saying: 'Fear not, nor grieve, but receive the good news of the paradise that has been promised to you.'" (Fussilat 41: 30). The renowned physician and philosopher, Ibn Sina, held a deep understanding of the crucial role that tranquillity plays in the healing process. In his book "canon of medicine", he emphasized the need to cultivate a peaceful state of mind before and during treatment, recognizing it as a fundamental aspect of effective treatment. In his words, "Panic is half of the ailment, calmness is half of the cure, and patience is the starting point of recovery."

Ibn Sina's insights demonstrate a holistic approach to healing, recognizing that both the mind and the body play important roles in promoting health and well-being (Wishah, 2018). By advocating for calmness and

tranquillity, he emphasized the importance of addressing not just the physical symptoms of illness, but also the emotional and psychological factors that contribute to one's overall state of health. With his emphasis on the central role of peace and calmness in the healing process, Ibn Sina remains a revered figure in the history of medicine, and his teachings continue to inspire contemporary physicians and healers (Gharayaq Zandi, 2020).

The Qur'an places great importance on the power of positive expression and constructive words in promoting health and well-being. The Qur'an states, "O humanity! Good advice has come to you from your Lord, and a cure for what is in your hearts, as well as guidance and mercy for the believers" (Yonus 10: 57). This passage highlights the transformative impact that positive words and thoughts can have on an individual's overall health and well-being.

The importance of building tranquillity and potential in the healing process is emphasized twice in the Qur'an: "We have revealed the Qur'an as a cure and a source of mercy for the believers, but for the unjust, it only leads to their destruction" (Al-Isra' 17: 82) and "Say, it is a guidance and cure for those who believe, but for those who do not believe, it is deafness in their ears and blindness for them. They are being called from a far-off place" (Fussilat 41: 44). While these elements create a conducive environment for healing, they are not enough to eradicate complex illnesses completely. The Qur'an recognizes the importance of not only promoting positivity and tranquillity in the healing process but also acknowledges the healing properties of natural substances. It highlights the therapeutic benefits of honey and other products sourced from flowers and fruits. This serves as a third aspect in the pursuit of cure and recovery. The Qur'an states, "You (Bees) shall eat from the flowers and fruits, and follow the path your Lord has made easy for you (Bees). From the bellies of the bees comes a drink of different colors, which contains a cure for humanity" (Al-Nahle 16: 69). This passage highlights the Qur'an's holistic approach to healing, recognizing the importance of positive expression, tranquillity and natural substances in promoting health and well-being.

The Qur'an provides comprehensive guidelines to avoid the spread of disease, including what is and is not considered permissible to consume, utilizing the concept of Halal-Tayyib. The Qur'an states, "O humanity, eat from the pure and good things on earth, and do not follow the

footsteps of Satan, for he is indeed a clear enemy to you" (Al Baqarah 2: 168). This verse emphasizes the importance of consuming only pure and lawful foods, in accordance with the Qur'an's teachings.

In Islamic teachings, tranquillity is closely connected with spirituality. Spirituality is understood as a combination of positive emotions, a deep understanding of one's relationship with the Creator, and a sense of satisfaction and success. This state of spirituality can be achieved by following the recommendations of Allah and fulfilling one's religious duties, such as prayer and charity. It is believed that spirituality enriches tranquillity and plays a significant role in creating a state of the heightened potential for healing.

Overall, the Qur'an's teachings promote a holistic approach to health and well-being, emphasizing the importance of pure and lawful food, positive expression, tranquillity, and spirituality in the healing process. By following these guidelines, individuals can achieve a state of balance and harmony that promotes physical, mental, and spiritual well-being. The Qur'an emphasizes the power of Allah in the healing process and reminds believers that every illness has a cure. The verse, "And when I am ill, it is He who cures me" (Al-Shuara 26: 80) highlights the belief that healing ultimately comes from Allah. This is further supported by the saying, "Every illness has a cure, and when the proper cure is applied to the disease, it heals by Allah's Will" (Sahih Muslim).

These teachings have inspired Muslim scholars and scientists to pursue knowledge and advance the fields of medicine, psychology, and physiology. By embracing the Qur'an's holistic approach to health and well-being, these individuals aim to improve human health and better understand the interplay between biological, behavioural, and social factors in the healing process.

3. Holistic healing and the role of Halal pharmaceuticals

Effective healing requires the patient's participation and a connection between the treatment and their lifestyle. Different individuals have unique lifestyles, dietary restrictions, and cultural beliefs that can affect their health. By aligning treatment with the patient's lifestyle, trust and confidence in the treatment is increased, leading to a personalized approach and enhanced healing. This approach,

known as Halalopathy, emphasizes the use of lifestyle-compatible medicines and a holistic, integrative approach to achieve complete recovery, rather than simply inducing remission (Alzeer, 2022d). This method not only utilizes the therapeutic effects of drugs, but also aims to activate the immune system and reduce entropy to promote healing.

The connection can be created by linking the therapeutic drug to the patient's lifestyle, which can vary greatly from person to person (Figure 1).

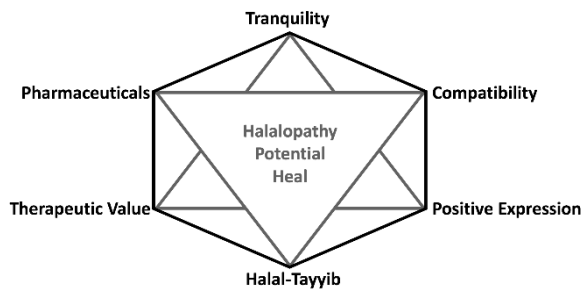


Figure 1. Key Components of Halal Pharmaceutical Compatibility for Holistic Healing

By creating a connection, a personalized health system can be established, which can increase trust and confidence, improve communication between the brain and the body, and activate the placebo effect. Halalopathy, a holistic approach to healing, goes beyond the curative effects of drugs and focuses on creating the optimal conditions for the body to heal itself, resulting in complete recovery. Halalopathy medicine is suitable for individuals following various lifestyles and dietary restrictions, such as gluten-free, glucose-free, lactose-free, vegetarian, vegan, kosher, and Halal (Alzeer et al. 2020c). Specifically, for those following a Halal lifestyle, the medicine must be produced in accordance with the principle of Halal-Tayyib (Alzeer et al. 2018a). This principle requires that all aspects of the medicine's production, from the ingredients used to the processes employed, must adhere to Islamic laws and be free from any non-Halal components (Ramli et al. 2012). This ensures that the medicine is not only effective in treating illnesses, but also aligns with the individual's religious beliefs and values (Alzeer et al. 2016). This results in a more integrated and orderly system, improving the body's defence mechanism and leading to more effective treatment. Halal-Tayyib labelling (Ningtyas et al. 2022) of medicines promotes confidence and strengthens the belief that the cure is compatible with one's lifestyle (Alzeer,

2020b). Taking non-Halal medicines can have a negative impact on the effectiveness of the treatment and cause discomfort. To adhere to the Halal-Tayyib principle, all ingredients must be closely monitored and evaluated during manufacturing (Alzeer et al. 2021b). This approach promotes stronger communication between mind and body, enriches tranquillity and leads to improved treatment outcomes that inspire hope rather than despair (Abullah et al. 2022). Further research is needed to fully understand the potential of Halalopathy and to improve Halal and Tayyib standards in the pharmaceutical industry (Kasri et al. 2023).

4. Discussion

Halalopathy, commonly referred to as permissible medicine, is a holistic and integrated approach to healthcare that aims to improve the prevention and treatment of disease (Alzeer, 2022e). It considers the interconnection of physical, mental, and spiritual well-being and takes into account the role of good lifestyle practices in maintaining health. Halalopathy incorporates the values of religion and lifestyle with the benefits of modern science, using a comprehensive approach and emphasizing the curative power of tranquillity and positive expression. Halalopathy focuses on preventing diseases by strengthening the immune system's fight mode and curing diseases by creating a compatible system (Alzeer, 2022f). The fight mode can be activated by reducing fear and grief, and enriching tranquillity and potential. The concept of Halalopathy emphasizes the importance of maintaining balance and homeostasis in the body through a combination of lifestyle, values, and energy. Halalopathy places great importance on the body's buffer capacity as a means of maintaining health and preventing disease. Just as buffers in a solution help to regulate pH, the body's own buffers, such as blood, energy, metabolic processes, and neurotransmitters, help to maintain a stable internal environment (Alzeer, 2023). By improving the buffer capacity through a healthy lifestyle and stress reduction, the body is better equipped to maintain balance and resist illness.

Halalopathy, considers entropy and potential energy as fundamental concepts for understanding the physical properties and natural processes of all objects. These two forces exist in every object and play a crucial role in Halalopathic medicine (Alzeer, 2020a). Entropy, which is also referred to as spontaneous energy,

is the negative form of energy that leads to an increase in heat (Alzeer, 2022c). On the other hand, potential energy is the highest form of positive energy, manifesting as work. Thus, entropy represents the passive and negative side of matter, while potential energy represents the active and positive side. Moreover, entropy and potential energy are interdependent and cannot exist without each other. Entropy moves in all directions randomly, while potential energy moves linearly and in an organized manner. In the mind-body perspective, factors such as knowledge, moral and spiritual values, and supportive information contribute to an increase in potential in form of voluntarily acquired energy, whereas material values and distracting information contribute to an increase in entropy in form of involuntarily acquired energy (Alzeer, 2022a).

From an Islamic perspective, Halalopathy is firmly rooted in the principle of Halal-Tayyib, which assures that all the ingredients, processes, and practices involved in the production of medicines are devoid of any impurities and abide by the dictates of the Shari'ah. The conjunction of medical therapy with spiritual convictions forms a more synchronized and well-ordered system, leading to a promoted immune response, enabling the body to be harmonized with labelled Halal-Tayyib drugs which will minimize the rejection process of the immune system, augment the duration of the drug's effect, and attain more effective treatment outcomes. Halalopathy is an important aspect of personalized medicine, where treatments are tailored to the specific needs of each patient and take into account their individual lifestyle. This approach is not limited to individuals who follow the Halal lifestyle but also takes into account those who adhere to other religions such as Buddhism, Christianity, Hinduism, and Judaism by avoiding ingredients that may conflict with their faith (Farouk et al. 2014). The use of medicines that are incompatible with an individual's lifestyle can have serious consequences, such as discontinuation of therapy, recurrence of symptoms, prolonged hospitalization, or even death (Sattar et al. 2004). By incorporating the principles of Halalopathy into personalized medicine, treatments can be designed to fit the patient's lifestyle, increasing the likelihood of successful outcomes and improving the patient's overall health and well-being (Elgharbawy et.al 2022).

5. Conclusion

Halalopathy is a novel approach to healthcare

that prioritizes the holistic well-being of individuals by taking into account the interconnection of physical, mental, and spiritual health, and the impact of good lifestyle practices. It combines the values of religion and lifestyle with the benefits of modern science and focuses on preventing diseases by strengthening the immune system and curing diseases by creating a compatible system. The principles of Halalopathy can be incorporated into personalized medicine, leading to treatments that are tailored to the specific needs of each patient and increasing the likelihood of successful outcomes. Medicines labelled with the Halal-Tayyib are highly desirable and preferred by many patients, especially in Muslim countries. The "Halal-Tayyib" label guarantees that the medicines have been manufactured under strict hygiene standards, with minimal contamination, and comply with Halal regulations. This labelling has a positive and comforting effect, reducing anxiety and creating favourable circumstances for more effective treatments.

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Conflict of interests

The authors declare no conflict of interest.

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Halalopatija: Integracija halal farmaceutskih proizvoda za holističko liječenje

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Pregledni rad

PODACI O RADU SAŽETAK

Ključne riječi:
Halal Pharma,
Integrativna
medicina,
Učinkovito
liječenje,
Personalizirana
terapija, Energija

Uvod: Halalopatija je novi pristup terapijskoj medicini koji naglašava kompatibilnost između lijekova i uvjerenja/životnog stila pacijenata.

Cilj rada: Istražiti kompatibilnost između lijekova i uvjerenja/stilova života pacijenata u kontekstu halal načina života, te razumjeti koncept Halalopatije u smislu entropije i potencijalne energije.

Materijal i metode: Pretraživanje literature, logičko razmišljanje, usporedba ideja, analogno razmišljanje, analiza podataka i generiranje konceptualnih ideja korišteni su za prikupljanje informacija, identifikaciju obrazaca, povlačenje paralela, testiranje hipoteza i generiranje novih ideja za doprinos trenutnom korpusu znanja i identificirati potencijalna područja za buduća istraživanja.

Rezultati i rasprava: Istraživanje je pokazalo da kompatibilnost između lijekova i uvjerenja/životnog stila pacijenata rezultira povećanim povjerenjem u liječenje, stimulacijom placebo učinka i skladnim odnosom između uma i lijekova. Halalopatska medicina, holistički pristup koji uključuje materijalne, ljudske, moralne i duhovne vrijednosti, temelji se na načelima entropije i potencijalne energije. Ovaj pristup poboljšava prevenciju i oporavak razumijevanjem tijela u smislu entropije i potencijalne energije i korištenjem tog razumijevanja za pružanje najprikladnijeg tretmana za svakog pojedinog pacijenta.

Zaključak: Halalopatija predstavlja novi terapijski koncept koji ima za cilj poboljšati kompatibilnost između čovjekovih uvjerenja/stila života i terapijskog lijeka, što dovodi do učinkovitijeg liječenja. Istraživanje pokazuje važnost ocjenjivanja sastojaka i pomnog praćenja proizvodnih procesa kako bi se osiguralo pridržavanje halal smjernica kako bi se postigla kompatibilnost i učinkovitiji tretman.

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Halal Food in The Context of Modern Life

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ABSTRACT

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Halal food and the concept of halal should be viewed in the context of civilizational continuity and perfection of living. This achievement is a reflection of the religious, cultural and traditional environment of the time in which we live. When we talk about halal food, we can also add elements of determination according to religion, health, cooking and the environment. This paper aims to investigate the motivation for consumption of halal food in society in order to credibly present halal food in the context of modern life. Articles from *PubMed*, *Scopus* and *Google Scholar* databases were used for writing. The review showed that the reflection of the culture of living mostly arises from the religious and sociological determination of man. Halal food in a comprehensive sense can promote Islamic culture and tradition and produce beautiful emotions, a sense of charity, satisfaction and gratitude to the dear God. This achievement is a reflection of the religious, cultural and traditional environment of the time in which we live, work and act. Due to these characteristics, halal food is gaining more and more universal value, which opens tables for it on all meridians and parallels. If we follow the fact that Halal food is permitted food, it means that it is hygienically and healthily correct, that it does not contain biological and chemical toxins harmful to human health, it means that it is safe and that, including all relevant aspects, it represents the food of modern life.

1. Introduction

Writing or discussing halal food takes on a wider educational dimension, which also gives it an enlightening character. In this way, an attempt is made to shed light on the aspect of Halal, while not avoiding the essence, which is reflected in the history of tradition and the derives from the provisions of the Constitution of Bosnia and Herzegovina, better known as the Dayton Peace Agreement, where Chapter I

history of modernity. If food is a universal resource of human existence, one cannot minimize the halal concept, which has been maintained throughout the centuries and which represents an important segment of “modern” and the unavoidable fact that it is the concept of modern living. The production and supervision of food products in Bosnia and Herzegovina under the title “Respect for Human Rights” in Article 1 talks about fundamental human rights and freedoms, which the parties will provide to

all persons, without discrimination based on gender, race, skin color, language, religion, national origin, etc. In this way, Bosnian society, opting for democratic principles of living, as a multi-ethnic society, opened the perspective of diversity in the expression of cultural, gastronomic and religious feelings and principles.

The modern world's motivation to consume halal food can stem from the fact that halal food, apart from being considered mandatory in the Islamic world, is food that is healthy and meets the nutritional criteria of modern man. Conscious consumers are looking for food that meets hygienic and health criteria and that will satisfy the psychophysical and intellectual activities of individuals and families (Sthapit et al. 2023). Halal food is popular in the world, because it meets hygiene and health standards. *The World Health Organization* (WHO) reports that 600 million people worldwide contract food-borne diseases annually, which hampers international tourism and the economy (WHO 2022). In terms of nutrient content and health correctness, halal food is safe for the consumer (Nazaruddin et al. 2023). Based on the research, the facts were recorded that in developed European countries there are restaurants that offer gastronomic specialties of halal origin, which is also interesting for people who are not of the Islamic faith and who are not obliged by religious laws to consume halal food (Ramli et al. 2023). This indicates that cultural reflection has a strong influence on the traditional component, which has improved over time and become more attractive and acceptable for all generations of different ethnicities. In addition to the religious aspect, the consumption of halal food also has a sociological aspect. Many people find motivation for a tourist trip in the consumption of food that is a reflection of the religious, cultural and traditional ambience of the country to which they are traveling (Said et al. 2023).

Objectives and purpose of the review

This paper aims to investigate the motivation for consumption of halal food in society in order to credibly present halal food in the context of modern life.

2. Overview of islamic culture and tradition

2.1. Halal concept

Halal is an Arabic word meaning “permitted”. The stipulations of halal are defined by Islamic law, and halal is anything that is permitted in the Muslim world (Osimani 2018; Sthapit et al. 2023a). Islamic teachings are consistent across time and space wherever Muslims live. Islam sends universal messages when it comes to halal food (Beik et al. 2021). The concept of halal food production is defined by halal standards. Halal food and drink are permitted food for the Muslim population, for members of the Islamic faith. The process of production and processing largely depends on whether food and drinks are allowed for consumption by the Muslim population, which is why production chains with halal products must have a halal certificate (Ramli et al. 2023; Wannasupchue et al. 2023). In addition to the fact that certain ingredients are prohibited for consumption, food must not contain biological and chemical poisons harmful to human health, such as: pathogenic microorganisms, pesticides, radionuclides, heavy metals, mycotoxins, antibiotics, hormones and other toxic harmful substances (bin Md Yusof & Nizar 2018). Allah SWT mentions in Surah Al-Baqarah verse 168: “O people, eat of all that is on earth that is lawful and good and do not follow in the footsteps of Satan.” Indeed, he is your obvious enemy “Prophet Muhammad SAW also mentioned in the hadith: God is good, loves good, pure, loves purity, cream, loves generosity, loves good, and cleanses you (Narrated by At-Tirmidhi 2723). Halal food is marked with a “halal logo” obtained during the halal certification process (Basri et al. 2023).

2.2. Haram concept

The concept of haram is defined by Islamic laws, and haram is everything that is prohibited in the Muslim world by the provisions of the Qur'an (Osimani 2018). Based on religious laws, Muslims are prohibited from consuming certain foods, which in the process of production and processing are not in accordance with Sharia laws and in the production process use procedures that are not in accordance with Sharia (Rusydziana et al. 2023). Any animal that is not slaughtered in accordance with religious law is haram, which means it is forbidden for Muslims. Halal food must not be in contact with haram food (Kurniawati & Cakravastia 2023). There are foods and drinks that are haram, completely forbidden for consumption in the Muslim world. Offal, blood and blood products are strictly forbidden (Qur'an 16:115). Pork,

meat from carnivores, mules and donkeys, crocodiles, reptiles, snakes, poisonous, dangerous sea animals, canine animals, birds of prey, as well as the consumption of alcoholic beverages, wine, ethyl are prohibited (Annisa et al. 2023; Batabura et al. 2023 ; Sthapit et al. 2023b). Muslims are forbidden to eat haram food, as it is considered harmful to human health and should be avoided as such. Also, the concept that you are what you eat is clearly emphasized in the Muslim religious book, the Qur'an (Maqsood & Ayyub 2023).

2.3. Religious slaughter and harmonization with European Union directives

Among the many traditional values, various forms of slaughtering animals for human consumption have also developed. The process of slaughtering animals that are used for human consumption requires special attention, if we want that animal to be slaughtered halal and consumed by people of the Muslim faith. The person performing the slaughtering of the animal must be familiar with halal standards and must be of the Islamic faith to understand the process of halal slaughtering animals used for human consumption. It is desirable, but not necessary, that the person performing the slaughter is employed by an organization that certifies halal products. Only healthy animals that are under the control of veterinary professional services are slaughtered (Chlebicz & Śliżewska 2018). After the animal is delivered to the slaughterhouse, it rests in the depot for a period of time, and then it is brought to slaughter. The person performing the slaughter says tasmiyyah (ie In the name of Allah) and takbeer (ie Allah is the greatest). It is important to take care of the welfare of animals, to behave as humanely as possible, to minimize the animal's pain, because this is prescribed by Islamic laws (Aini et al. 2022). The slaughter must be quick with a sharp knife and two large blood vessels must be cut. Animal rights activists believe that halal slaughter causes pain to the animal and that halal slaughter should include prior stunning (Ramli et al. 2023).

Considering the concern for animal welfare, it is considered that halal standards, in addition to regular halal slaughter, should also include slaughter with stunning of the animal, but this leads to a divergent attitude between modern and traditional. The stunning process may be questionable in halal slaughter, as the animal

must not die (Abdallah et al. 2021; Bouzraa et al. 2023). There are fatwas¹ that allow stunning provided the animal remains alive. In the world (New Zealand, Australia), the number of slaughterhouses that use methods of electrical stunning of cattle (cattle and sheep) is growing. Meat from these slaughterhouses is exported to countries in the Middle East with an original Islamic tradition. Scientific research has shown that the practice of slaughter, without stunning, causes problems related to animal welfare such as stress, pain, suffering before and during slaughter. It was established that after slaughtering, death occurs in a period of 2 to 15 seconds, and in the case of disturbed throats, up to a minute. The stunning procedure must be completed within five seconds (Bouzraa et al. 2023; Chandia & Soon 2018). According to the current legislation of the European Union, halal slaughter without stunning is allowed only in exceptional cases (Council Regulation (EC) 1099/2009). It is very important that the bleeding process lasts long enough. During the bleeding process, which should last about 1-3 minutes, the meat must not be processed. During slaughter, it is forbidden to destroy the spinal cord of the animal (Hossain et al. 2023). It is also important to emphasize that halal animals must not be slaughtered in the receiving slaughterhouse together with non-halal animals (Aziz 2023; Shahdan et al. 2017).

Sacrifice is obligatory for Muslims (Qur'an 108:2). The act of slaughtering a sacrifice represents a rite of animal sacrifice with the aim of "getting closer to God", thereby protecting human life, with an emphasized social dimension (Qur'an 37:105-107). By the act of sacrificing a sacrifice (certain animals), animals are used for food, human life is protected and the poor and people in need are helped (Masri 2016). The purpose of slaughtering the sacrifice is to do good, which consists in donating meat and helping the poor and needy (Qur'an 22:35-36). Unlike the sacrifice, which is known to all

¹ A fatwa is a derived legal norm confirmed by a religious authority or institution. Fatwas of the mufti of Delhi from 1935 are cited. in which it is stated that stunning does not violate any religious law, because stunning does not kill the animal (which would be contrary to Islamic regulations on slaughter), but only "stuns". Stunning is allowed until the moment the animal dies during the stunning. Another authoritative Islamic statement regarding religious slaughter is the 1982 statement by the rector of Al-Azhar University in Cairo, according to which stunning is not contrary to Islam (Lerner & Rabello 2006; Zoethout 2013).

religions, the sacrifice in Islam is intended for people, for their benefit. In the Islamic tradition, sacrifice has religious, moral and social significance and serves man in his moral and social elevation. The practice is that the sacrifice is not only slaughtered during Eid al-Adha, but also on other significant occasions (birth of children, laying the foundation of a house, pilgrimage, vow, according to a will), which expresses gratitude to God for answered prayers and blessings.²

Animals must be treated with kindness and respect (Qur'an 5:2), and the animal must be spared any pain, which is also in accordance with (Council Regulation (EC) 1099/2009). The person performing the slaughter must be professional (skilled) and must use a sharp tool (Tafsir 871-873), which is in accordance with (Council Regulation (EC) 1099/2009). The animal must be healthy, without defects and must not be emaciated or emaciated (Qur'an 2:71). For the sacrifice in Islam, Muslims are not allowed to slaughter animals under 5 years old (camels), under 2 years old (cows) and over 1 year old (sheep) (Tafsir 874). In this way, biological reproduction is ensured. Also, on the basis of Chapter V of Decisions related to meat, paragraph 1 point c) of the Rulebook on the organization of official controls of products of animal origin intended for human consumption („Official Gazette of BiH“, number 103/12), it is prescribed that meat is declared unsuitable for human consumption if it comes from animals that died before slaughter, stillborn, unborn or slaughtered at an age younger than seven days. Based on the above, it can be concluded that there is a general saturation of religious slaughter with a hygiene package that results from legal legislation (Kumalić 2018).

3. Halal standards and certification process in the food chain

In the intensive breeding of halal-allowed species of animals, in order not to make a mistake in choosing the type of animal for food production, it is advisable to follow religiously-educated and professional people, methabas. It is important that a trained person supervises the breeders or suppliers of animals that are further transported to slaughterhouses. One-year supervision is carried out by organizations for halal certification, which must employ a

religious advisor, inspector and supervisor who is trained to supervise the production and processing of food of animal origin, but who also knows halal standards and must be a Muslim. A halal certificate is a written fatwa that guarantees that a product is halal, permitted for use by Muslims (Al Bayari et al. 2023; Hidayati et al. 2023).

When transporting animals to halal slaughter and during primary processing and processing in slaughterhouses, care must be taken that these processes do not contribute to the deterioration of the sanitary quality of the meat. Sanitation of means of transport, trucks, transport cages used for transporting animals is mandatory. Supervision by officials of the organization for halal certification is mandatory, and the method and type of detergents and disinfectants used in the sanitation process are monitored (Shahdan et al. 2017). Contamination of working surfaces, utensils, devices and meat in slaughterhouses can be reduced if the HACCP concept, veterinary-sanitary control that includes *Good Manufacturing Practice* (DPP) and *Good Hygienic Practice* (DHP) is implemented (Castañeda-Gulla et al. 2020; Khlil & Mustafa 2023). Halal standards related to the slaughter process are mostly similar everywhere in the world, only the issue of stunning the animal before slaughter is questionable and opinions are divided (Ramli et al. 2023). Sterile knives are used during evisceration, i.e. removing organs and processing carcasses, and all work surfaces as well as workers' hands must be disinfected. Strict biosecurity measures must be applied to reduce the chances of cross-contamination (Al-Mahmood & Fraser 2023; Supian 2018).

Hygienic meat carcasses, which are confirmed by a veterinary health examination, are further cooled at a temperature of 4°C for a period of one hour, without freezing (Perez-Arnedo & Gonzalez-Fandos 2019). The carcasses must be separated, they must not be stacked on top of each other, because the cooling phase must run smoothly (Lu et al. 2019). During packaging, hygienic and sanitary measures should be applied and care should be taken to ensure that halal products are not mixed with non-halal products. All packages must have a halal mark/logo in addition to the name, address of the manufacturer and veterinary control number. During the storage of halal products, halal products must be separated from non-halal products. Zero tolerance for the presence of non-halal products is prescribed (Lestari et al. 2023).

² It is a voluntary sacrifice, while the sacrifice during Kurban Bayram is an obligation.

It is very important to establish a consensus in all Islamic countries (OIC) to ensure uniform halal standards that will be valid for all Islamic countries (Halim & Salleh 2012).

4. Motivation of the non-muslim world for consuming halal food

4.1. Food safety according to halal standards

In the chain of food production and processing, from farm to table, there are a large number of factors that affect the hygienic condition of both raw materials and final products. Precisely for these reasons, the healthiness and quality of food of animal and plant origin, i.e. their production and trade, as well as control, are regulated by appropriate normative acts, which in terms of content and formal-legal are largely correlated with the production of Halal food (Mohamed and et al. 2016). Halal food with a halal certificate must meet the strictest hygiene and health requirements, which means that it is safe for consumption (Khlil & Mustafa 2023). Raising animals on a farm can often be a primary source of disease, so farm hygiene and breeding hygiene are very important. Farms cannot be completely freed from pathogens, but regular implementation of hygienic and sanitary procedures can reduce the frequency of various infections of domestic animals. Floors, walls, feeders and waterers must be adequately cleaned and disinfected. Water and feed for animals used for human consumption must not contain biological pollutants/contaminants or chemical residues (Mota-Gutierrez et al. 2022).

Research shows that animals slaughtered in a halal manner have the best microbiological meat status. In recent times, in addition to regular halal slaughter, stunning is also mentioned, so that the animal suffers as little pain as possible during slaughter. Stunning was not included in regular halal slaughter according to tradition and Islamic law, but concern for animal welfare led to the inclusion of pre-slaughter stunning, while minimizing animal pain. Recent research suggests that halal stunning slaughter produces halal meat of the best sanitary quality. In the meat, there is also a noticeable decrease in parameters that indicate that the animal was under stress (Bouzraa et al. 2023). During bleeding, processing and evisceration – removal of organs is not done, so that the meat is not contaminated with blood and other biological

contaminants from the stomach, intestines and bile, because the meat thus obtained would not be halal meat. After bleeding, the primary processing of the slaughtered animal continues, i.e. separation of the front and rear limbs, skinning, evisceration, and in the case of large cattle, cutting the carcass into halves (Perez-Arnedo & Gonzalez-Fandos 2019). Cross-contaminated meat is often a source of biological contaminants that reduce the sanitary quality of meat, and can cause foodborne diseases in consumers (Seliwiorstow et al. 2016).

4.2. Economic motivation of European countries for the production and marketing of halal food

The halal food market exceeds the value of 632 billion USD with a tendency of further growth, which indicates that there is a great economic motivation for this economic activity (Belhaj 2018). The economic motivation of European countries to open halal restaurants can be reflected in the growth of a country's economy. Halal restaurants especially attract Muslim tourists, for whom such restaurants evoke good emotions, which is reflected in the observance of Islamic laws (Sthapit et al. 2023a). On the other hand, as far as the sociological aspect is concerned, it attracts non-Muslim tourists who want to try something new, food consumed by Muslims, which is hygienically correct and represents a gastronomic delicacy (Sthapit et al. 2023b). Halal tourism has become one of the important strategic sectors for increasing the economy of a country, and the guarantee of halal products, which is reflected through halal standards and certification of halal products, increases the arrival of Muslims in non-Muslim countries (Nuraini 2021). Halal restaurants are related to the culture of living of a people, which stems from the religious and sociological commitment of a person. Cultural reflection has a strong influence on the traditional component, which developed and improved over time and became more attractive and acceptable for all generations. Gastronomy took on its true character and gave cooking a real specificity (Jamal & Sharifuddin 2015; Said et al. 2023). The demand for halal food is present among Muslims due to religious laws, but it also attracts the non-Muslim world. Halal restaurants are associated with healthy eating and that is why this economic sector is developing

(Mohamed et al. 2016). Halal food is associated with traditional Muslim dishes that have an exotic taste, which additionally attracts guests of halal restaurants (Moshin et al. 2020). All of the above has determined many countries to produce and offer halal products to tourists in their restaurants, which are known for their specific organoleptic properties. There are many such restaurants, and they can be found in the UK, Germany, France, the Netherlands, Thailand, Japan, South Korea and other countries with predominantly non-Muslim populations (Secinaro & Calandra 2020; Sthapit et al. 2023a).

5. Overview of society's motivation for halal food consumption

The aim of this paper is to investigate the motivation for consumption of halal food in society in order to credibly present this food in the context of modern life. The motivation of the Muslim world is reflected through Islamic laws, and the motivation of the non-Muslim world is related to the health, sociological and economic aspects of modern life. In a study on the motivation of non-Muslim tourists to consume halal food that included 311 respondents, Sthapit et al. (2023a) report positive data where more than half of the respondents believe that consuming halal food is imperative when traveling. For the majority of non-Muslim respondents, trying halal food is not the only reason for traveling. Consuming halal food provides unforgettable experiences to non-Muslim respondents who experience a foreign culture through food, which is considered one of the motives for consuming halal food.

According to a study in Indonesia, where the majority of the Muslim population lives, a survey was conducted on the intentions of Generation Z Muslims to consume halal food. Febriandika et al. (2023) report the results of a survey that included 352 respondents of this generation of Muslims. The results showed that religious beliefs as well as health reasons are a key motive for increasing awareness of halal food, which contributed to the purchase of halal food. Islamic food brands are not a motive for purchasing halal food among Generation Z Muslims. In a study on halal tourism in Indonesia that included 205 Muslim millennials and Generation Z, Bearakon et al. (2023) state that the spread of halal knowledge has a positive effect on the intentions of this generation of

Muslims to consume halal products. Knowledge about halal food mostly depends on the religiosity of the individual of the Islamic faith. In a retrospective study of non-Muslim tourists' experiences of halal food consumption in 2021, Sthapit et al. (2023b) report positive experiences among 293 non-Muslim respondents. Using an online questionnaire, they obtained data that authenticity, service environment, community and sensory appeal influenced the memorable experiences of non-Muslim tourists, which positively affects attachment to a particular tourist destination. According to a systematic review on the low motivation of non-Muslims to consume halal food, Ramli et al. (2023) state that the non-Muslim world's lack of motivation to consume halal food is most often the result of a negative attitude towards halal food and a lack of awareness about the safety of halal food. Motives that deter the non-Muslim population from consuming halal food stem from misperceptions of low food quality, and less often from halal brand logos, lack of awareness about halal food, insufficient entrepreneurial marketing, etc.

In a study in Ghana on dimensions of innovation and entrepreneurial marketing for halal food SMEs using 432 questionnaires, Deku et al. (2023) report positive results on the impact of entrepreneurial marketing on the performance of small and medium-sized enterprises engaged in the production of halal food. All of the above ensures a positive financial result of the business. Based on a study in Thailand related to obtaining halal certification in restaurants, Wannasupchue et al. (2023) state that the results of the analysis indicate that obtaining a halal certificate is a complicated process. The study shows that the fees are quite high, which reduces the motivation of restaurant owners to persist in the certification process. In Taiwan, where a predominantly non-Muslim population lives, a study was done on what is the key incentive for companies with halal certification. The study was conducted based on an online/offline questionnaire, to which 41 responses were received. Amalia et al. (2023) reported that companies in Taiwan practice halal products because their business is focused on innovation and they see halal business as an opportunity for economic growth.

In a study on knowledge and attitudes towards halal meat products, which included respondents from the non-Muslim world in Australia (n=565)

and the Muslim population in Malaysia (n=740), Jalil et al. (2018) report that the Muslim world is more aware of the main principles of halal meat production (slaughtering). The Muslim world was more concerned about the humane treatment of animals during halal slaughter and generally believed that stunning was not permitted, while the non-Muslim world condoned it. Consumer attitudes to consume halal products are mainly based on an individual's religion and education.

6. Conclusion

Halal food in a comprehensive sense can promote Islamic culture and tradition and produce beautiful emotions, a sense of charity, satisfaction and gratitude to the dear God. This achievement is a reflection of the religious, cultural and traditional environment of the time in which we live, work and act. Due to these characteristics, halal food is gaining more and more universal value, which opens tables for it on all meridians and parallels. If we follow the fact that Halal food is permitted food, it means that it is hygienically and healthily correct, that it does not contain biological and chemical toxins harmful to human health, it means that it is safe and that, including all relevant aspects, it represents the food of modern life.

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Halal hrana u kontekstu savremenog življenja

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Pregledni rad

PODACI O RADU

SAŽETAK

Ključne riječi:

*halal hrana,
gastronomija,
motivacija, savremeno
življenje.*

Halal hranu i koncept halala treba posmatrati u kontekstu civilizacijskog kontinuiteta i savršenstva življenja. Ovo dostignuće je refleksija religijskog, kulturnog i tradicijskog ambijenta vremena u kojem živimo. Kada govorimo o halal hrani, možemo dodati i elemente određenja prema vjeri, zdravlju, kulinarstvu i okolišu. Ovaj rad ima za cilj istražiti motivaciju za konzumaciju halal hrane u društvu kako bi se halal hrana vjerodostojno predstavila u kontekstu savremenog življenja. Za pisanje su korišteni članci iz baza podataka PubMed, Scopus i Google Scholar. Pregled je pokazao da odraz kulture življenja najvećim dijelom nastaje iz vjerskog i sociološkog određenja čovjeka. Kulturna refleksija ima snažan utjecaj na tradicionalnu komponentu, koja se razvijala i usavršavala kroz vrijeme i postajala atraktivnija i prihvatljivija za sve generacije. Gastronomija je poprimila svoj pravi karakter i dala kulinarstvu pravu specifičnost. Da bi se u cijelosti shvatio koncept halal hrane, potrebno je razumjeti sveobuhvatan ciklus od primarne biljne i animalne proizvodnje, odnos farmera prema proizvodnji sa akcentom na zoohigijenske uslove uzgoja i dobrobit životinja, tehnologiju proizvodnje i prerade hrane, nutritivno-higijenske i zdravstvene aspekte, distribuciju, skladištenje, prodaju i odnos potrošača, države/društva prema konceptu halala, kako bi se halal hrana "pozicionirala" u kontekstu savremenog življenja.

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Halal Standards Around the Globe: A Comparative Study

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ABSTRACT

Halal food standards refer to the set of dietary guidelines and regulations for Muslims that govern the preparation, handling, and consumption of food. These standards have been published by various countries and organizations worldwide, leading to a diverse range of Halal standards. The varying publication of Halal standards by different countries has posed a challenge for the industry to comply with a unified standard, resulting in a complex and inconsistent landscape. This study aims to compare and analyze the major Halal standards used worldwide, including MS 1500 from Malaysia, GSO 2055-1 from the Gulf Cooperation Council, HAS 23000 from Indonesia, MUIS HC S001 from Singapore, and OIC/SMIIC 1 from the Organization of the Islamic Cooperation (OIC). This study will compare various aspects of the major Halal standards including, but not limited to, methods used for animals stunning, mechanical slaughtering, slaughtering by the peoples of the book, alcohol usage and concentration, insects and their by-products, and vinegar processing. The results of this study will provide a better understanding of the differences in Halal standards and their impact on the global Halal industry. This study is expected to help stakeholders understand these standards and contribute to the development of harmonized Halal standards in the future.

1. Introduction

Halal is an Arabic term that generally refers to permitted items and actions. It is the opposite of Haram, which denotes that which is forbidden. In a broader sense, Muslims attach immense significance to the concept of Halal (Benzertiha et al., 2018; Khattak et al., 2011). It outlines the way of life they must adopt in accordance with the Islamic principles that every Muslim must observe. In a restricted context, one can refer to the Halal industry, which is frequently misinterpreted as relating solely to food and ritual slaughter. In addition to culinary products, the Halal industry includes tourism (including the hotel and service industries), banking,

cosmetics, and pharmaceuticals. Muslims currently constitute more than one-third of the world's population (Rezai et al., 2007).

According to Islamic dietary law, Halal food is a food that satisfies the requirements of Islamic dietary law as specified by the Quran and Sunnah. Halal food consumption is not only a religious necessity but also a matter of ethics and food safety. Due to the increasing demand for Halal products among Muslim consumers, the issue of Halal food has become of interest to the food industry. According to Islamic law, Halal meat is obtained from Halal animals slaughtered in a specific manner (Regenstein et al., 2007).

Halal food is consumed by both Muslims and

non-Muslims due to its perceived high quality and ethical standards (Benzertiha et al., 2018). Nooh et al., (2007) found that younger Muslims know more about Halal cuisine and its certification process. In the Muslim community, Halal cuisine has significant cultural and social significance. It is a crucial component of Islamic identity and a means of preserving their religious beliefs and practices. Halal food also plays a significant role in social gatherings, where food brings people together.

Halal certification guarantees that the food and its ingredients comply with Halal standards. Halal food consumption is not limited to Muslims, and its global market is expanding significantly. The certification procedure includes an evaluation of the production method, ingredients, and storage and transport of the product. Halal certification is typically administered by government-recognized Islamic organizations or by independent Halal certification bodies. Each country has its Halal certification bodies, which are in charge of issuing Halal certificates (Lutfika et al., 2022).

Halal certification bodies are responsible for ensuring that products and services meet the Islamic dietary requirements, as set out by the Halal standards. These standards are typically published by a government authority of a specific country, and Halal certification bodies use them as a reference to certify the Halal status of products. However, the existence of multiple Halal standards around the world can create confusion among food manufacturers who operate in different markets. These differences can include variations in the Halal certification process, permitted ingredients, and slaughter practices, among others (Abdallah et al., 2021).

In recent years, the Halal market, which encompasses a vast multitude of products and services permitted by Islamic law, has experienced rapid growth. From food and beverages to finance and tourism, the global Halal market is estimated to be worth trillions of dollars, with this value expected to rise as the Muslim population grows and more consumers seek out Halal products (Dinar Standard, 2022).

According to the Dinar Standard report (2022), the world's 1.9 billion Muslims spent the equivalent of \$2 trillion in 2021 in food, pharmaceutical, cosmetics, fashion, travel, and media/recreation industries, all of which are influenced by ethical consumption requirements inspired by the Islamic faith. Assets related to Islamic finance are projected by an increase of 7.8% from US\$3.4 trillion in 2020 to

US\$3.6 trillion in 2021, representing an annual growth rate of 8.2% (Dinar Standard, 2022).

Table 1. Total spending and growth of the Halal economy (Dinar Standard, 2022)

Category	2021 Spend (US\$ billion)	Expected Growth in 2022	Expected Spend in 2025 (US\$ billion)
Food and Beverages	1,270	7.00%	1,670
Halal Finance	3,600	8.00%	4,900
Halal Tourism	102	50.00%	189
Modest Fashion	295	6.00%	375
Pharmaceuticals	100	6.70%	129
Halal Cosmetics and Personal Care	70	7.20%	93
Media Sector	231	7.50%	308
Investments	25.7	-	-

Despite the ongoing uncertainty associated with the pandemic situation, it is anticipated that global Muslim spending will increase by 9.1% in 2022, excluding the Islamic finance sector, for the Islamic economy sectors covered in this report. By the end of 2021, with the exception of travel, all of these sectors have returned to their pre-pandemic expenditure levels. At a Cumulative Annual Growth Rate (CAGR) of 7.5% over the next four years, Muslim spending is expected to reach \$2.8 trillion by 2025 (Dinar Standard, 2022). With the growing demand for Halal products, there has been an increasing interest in understanding the various Halal standards and certification systems that are used across different countries. This comparative study aims to examine the various Halal standards and certification systems used in different countries and to compare their similarities and differences. The study will provide valuable insights into the current state of Halal standards and certification, as well as highlight areas for improvement and future development. The results of this study will be of interest to scholars, researchers, policymakers, and industry stakeholders who are concerned with the development and growth of the Halal industry.

2. Halal standard

Halal food standards is a set of requirements that have to be compliance with Islamic rules in order to have Halal certified products. Nonetheless, there are numerous distinct Halal standards, each with its own set of rules and requirements with minor differences. Multiple

Halal standards are recognized and implemented by various countries and organizations, including MS 1500, GSO/UAE.S 2055.1, HAS 23000, MUIS HC S001, and OIC/SMIIC 1.

MS 1500 is a Malaysian government-issued standard addresses all aspects of Halal certification, including processing, handling, and packaging of Halal products. It also incorporates animal welfare and Halal slaughtering guidelines. Halal certification organizations use MS1500 as a point of reference in Southeast Asia. It includes hygiene, packaging, storage, and transportation requirements for Halal food products (DSM, 2019).

GSO/UAE.S 2055.1 is a Halal standard issued by the Gulf Cooperation Council (GCC) and the UAE, covers the entire food supply chain, from farm to table. It includes guidelines for Halal slaughtering, animal welfare, and the use of Halal ingredients. This standard also covers the labeling and marketing of Halal products (GSO, 2015a).

HAS 23000 is the Indonesian Halal certification standard developed by the Indonesian Council of Ulama (MUI) and covers the entire food supply chain, from farm to table. Guidelines for Halal slaughtering, animal welfare, and the use of Halal ingredients. HAS 2300 also covers the labeling and marketing of Halal products.

It also includes guidelines for the sourcing of

raw materials, processing, and labeling of Halal food

products (LPPOM MUI, 2021).

MUIS HC S001 is a standard developed by the Majelis Ulama Islam Singapura (MUIS) in Singapore. It includes guidelines for the sourcing of raw materials, processing, and labeling of Halal food products, and covers other areas such as food additives, enzymes, and flavorings (MUIS, 2005).

The Organization of Islamic Cooperation (OIC) and the Standards and Metrology Institute for the Islamic Countries (SMIIC) have developed a Halal standard (OIC/SMIIC 1) that is intended to be used globally. The standard covers all aspects of the Halal food supply chain and includes guidelines for the sourcing of raw materials, processing, and labeling of Halal food products (OIC/SMIIC, 2019).

3. Production plant and its cleaning

Despite the fact that the basic requirements for Halal food production are similar, there are differences, particularly in the specific standards and requirements that need to be followed. In this chapter, the similarities and discrepancies in term of the condition of the production plant and its cleaning procedures are summarized in the **Error! Reference source not found..**

Table 2. The requirements of the production plant and its cleaning procedure in various Halal standards

Requirements	MS 1500 (DSM, 2019)	GSO/UAE.S 2055.1 (GSO, 2018)	HAS 23000 (LPPOM MUI, 2021)	MUIS HC S001 (MUIS, 2005)	OIC/SMIIC 1 (OIC/SMIIC, 2019)
Halal product must be separated from non-Halal products	✓	✓	✓	✓	✓
All Halal products must be Halal labelled to be easily segregated	✓	✓	not mandatory	✓	✓
General cleaning is a must when transforming from non-Halal to Halal production	✓	✓	✓	✓	✓
Soil must be used to clean heavy <i>najis</i>	✓	not required	not required	✓	✓
Shifting from non-Halal to Halal production is not allowed in regular basis	✓	✓	allowed if it is pork free	✓	✓
Chemical agents including cleaning substances, greases or fats shall not contain non-Halal materials	✓	✓	✓	✓	✓
Hygiene, sanitary and food safety are prerequisites in the Halal food production	✓	✓	✓	✓	✓
The production facility must be segregated and well insulated from pig farm or its processing	✓	✓	✓	✓	✓
Pest control program must be implemented	✓	not stipulated	not stipulated	not stipulated	not stipulated
Tools or elements of religious worship are not allowed in the production facility	✓	not stipulated	not stipulated	not stipulated	not stipulated
Muslim praying room must be available	✓	not stipulated	not stipulated	not stipulated	not stipulated

All standards compared in this study mentioned

that separating Halal products with non-Halal

products is necessary to avoid cross contamination. In order to increase the effectivity of the separation during storage and transportation, most standards oblige to mark the product with Halal label. However, HAS 23000 does not make this action mandatory as long as it can be separated, and cross contamination can be avoided. Additionally, all standards agreed that the production facility must be segregated and well insulated from pig farm or its processing.

At a similar tone, all of the standards require general cleaning when transforming from non-Halal to Halal production. This transformation is a solution for the company that opts into Halal production without new equipment and facilities installation. Generally, shifting from non-Halal to Halal production is not allowed on a regular basis. Consequently, MS 1500, MUIS HC S001, GSO/UAE.S 2055.1, and OIC/SMIIC 1 stipulate that the facilities must be Halal dedicated. While HAS 23000 permits to use of the facilities interchangeably with non-Halal production with the condition that pork and its derivatives are not used in the shared facilities.

Furthermore, these standards agreed that there are three types of *najis* (impurities) that shall be cleaned before Halal production. Heavy *najis* are the things from swine and pork. Intermediate *najis* are blood, vomits, vaginal, anal and penile discharge and from other parts of a human and animal body. Light *najis* is the urine of a baby boy under two years old who consumed his mother's milk exclusively.

The way of purification on intermediate and light *najis* is similar from one to another standard. Both types of these *najis* can be easily purified by removing the *najis* and washing the contaminated area using water. Whereas heavy *najis* must be cleaned by washing them seven times using water and one of them using a mixture of water and soil. MS 1900, MUIS HC S001 and OIC/SMIIC 1 stipulate that soil must be used to purify the heavy *najis*. On the contrary, GSO/UAE.S 2055.1 and HAS 23000 allow using soil, soap, detergent or any chemicals that can remove the odor and color of the *najis*. Additionally, concerning the cleaning procedures requirements, all the countries require chemical agents, including cleaning substances, greases or fats free from non-Halal materials.

In addition, hygiene, sanitary and food safety are the pre-requirement in Halal food production. This requirement ensures that Halal food production is safe for human consumption.

Generally, the basic requirement of every food production is food safety. Halal is the added value food products can have so that Muslims can consume them. Although all the standards mention that hygiene and sanitary are the prerequisites of Halal food production, only MS 1500 explicitly requires the implementation of the pest control program.

Another difference is related to the Muslim praying room and tools of religious worship. Even though most of the standards do not require, MS 1500 obliges the manufacturer to have a Muslim praying room in the production plant facility. Simultaneously, MS 1500 forbid any tools or elements of religious worship other than Muslim.

4. Animal slaughtering

Animal slaughtering is one of the key elements of the Halal requirement for meat which shall be fulfilled (Bozzo et al., 2020). Generally, food is originally either from plants or animals. Plant-origin material is naturally Halal unless it has intoxicating properties. This definition excludes any alcoholic beverages and any plants that by its origin, possess intoxicating agents such as marijuana, cocaine or heroin (Mehra et al., 2019).

On the other hand, all amphibious animal is considered unlawful. In the middle of that, there are land animals that, by their origin, are not Halal unless it fulfills two requirements: 1) Classified as Halal animals such as cow, goat/sheep, or poultry, 2) they are appropriately slaughtered according to Islamic Law (Jalil et al., 2019). All the standards agreed about the type of animal that Muslims can consume. However, there are some specific differences in the standards regarding slaughtering. These differences generate problems in determining which meat is Halal and which is not. For instance, according to GSO/UAE.S 993, an animal can be slaughtered by either Muslims, Jews or Christians. While HAS 23103, MS 1900 and OIC/SMIIC 1 only allow Muslims. In this case, an animal slaughtered according to the GSO/UAE.S standard might not be suitable to be exported to Indonesia or Malaysia.

The differences may generate confusion, particularly for the manufacturer in a non-majority Muslim country where Halal is unpopular among them. The producer wants to export the product to Islamic countries where Halal is required, but which standards must be

followed is still a question. **Error! Reference source not found.** compares Halal slaughtering requirements among six different Halal standards, Malaysia, UAE.S2022, GSO 2015, Indonesia, Singapore, and OIC/SMIIC. The requirements vary among the standard, with some having stricter requirements than others. Halal

Animal slaughtering is the act or process to kill animals to obtain meat and offal's for human consumption. To slaughter the animal, sticking (neck cutting) is carried out using sharp knife to sever major blood vessels involving the esophagus, two jugular veins and pharynx of the animal ensuring rapid and complete blood loss (Fuseini et al., 2016). Before the slit of the

animal, stunning may be used to reduce the animal's mobility animal and ease the slaughtering process. Stunning is a method to make the animals unconscious with or without killing them to improve the efficiency of the slaughtering (Yardimci, 2019). Several studies mentioned that stunning might eliminate the fear or pain in the animal (Abdallah et al., 2021; Abdullah et al., 2019). However, this conclusion is still debatable since many researcher also against it and reported that stunning magnifies animal suffering and stress during slaughtering process (Nakyinsige, Fatimah, et al., 2014; Nakyinsige, Sazili, et al., 2014; Yardimci, 2019).

Table 2. Slaughtering requirements according to various standards

Requirements	MS 1500 (DSM, 2019)	UAE.S 993: 2022 (GSO, 2022)	GSO/UAE.S 993:2015 (GSO, 2015b)	HAS 23103 (LPPOM MUI, 2012)	MUIS HC S001 (MUIS, 2005)	OIC / SMIIC 1 (OIC/SMIIC, 2019)
Stunning is not recommended	not stipulated	✓	✓	not stipulated	not stipulated	✓
Stunning that results in death or heart stop of the animal is strictly forbidden	✓	✓	✓	✓	✓	✓
Stunning must be periodically verified and revied by HCB to ensure that the stunning does not kill the animal	✓	✓	✓	✓	✓	✓
Stunning using penetrative captive bolt, ax/hammer or air blowing and gassing is prohibited	✓	✓	✓	✓	✓	✓
The stunning operator is preferably a Muslim	✓	X	X	X	✓	X
Stunning on poultry is not permitted	X	X	✓	X	X	X
The performance of the stunner must be controlled and verified by qualified and trained personnel	✓	✓	✓	✓	✓	X
The blood flow of the stunned animal should be monitored, if less than normal amount of blood observed the carcass is treated as non-Halal	X	✓	X	X	X	X
Only electrical water batch is permitted for poultry stunning	✓	✓	poultry stunning is prohibited	✓	✓	✓

Table 2. Slaughtering requirements according to various standards

Requirements	MS 1500 (DSM, 2019)	UAE.S 993: 2022 (GSO, 2022)	GSO/UAE.S 993:2015 (GSO, 2015b)	HAS 23103 (LPPOM MUI, 2012)	MUIS HC S001 (MUIS, 2005)	OIC / SMII C 1 (OIC/SMIIC, 2019)
All the carcasses must be examined to indicate if the animal is dead before slaughtered	✓	✓	✓	✓	✓	✓
The Slaughtermen shall be Muslim	✓	X	X	✓	✓	✓
The Slaughtermen can be either Muslim, Jew or Christian	X	✓	✓	X	X	X
The Slaughtermen shall be minimum 18 years old	X	X	X	✓	X	X
The Slaughtermen shall be an adult	✓	✓	✓	✓	✓	✓
The Slaughterman shall be authorized by competent Halal body	✓	✓	✓	✓	✓	✓
Slaughtering shall be done by or under direct actual supervision of the HCB	X	X	✓	X	X	✓
Mechanical slaughtering is allowed	✓	✓	✓	✓	✓	✓
Mechanical slaughtering can be used if the percentage of mis-cutting is under 1%	X	X	X	✓	X	X
The bleeding period of poultry shall be at least 180 seconds	not stipulated	not stipulated	✓	✓	not stipulated	✓
At least two surveillance cameras must be installed in the slaughtering area and the film must be preserved for at least 90 days	X	recommended	X	X	X	X

Stunning can be done using various techniques, including electrical stunning, captive bolt stunning, gas stunning or air-blowing stunning (Yardimci, 2019). All Halal standards prohibit stunning using penetrative captive bolt, ax/hammer or air blowing, and gas stunning. However, MS 1500, UAE.S993:2022, HAS 23103, OIC/SMIIC 1 and MUIS HC S001 mentioned that an electrical water bath is an only permitted method for poultry stunning. In contrast, GSO 993:2015 even strictly exclude poultry stunning for Halal food production. According to common definitions, stunning may

result in the animal's death before slaughter. In this case, the carcass is considered as non-Halal. On this basis, the stunning process is not recommended by most standards. Additionally, without any strict control of the stunning process, it cannot be guaranteed that the animal is not killed before slaughtering (Abdallah et al., 2021). Therefore, all standards require the stunning parameter process to be verified and reviewed by the Halal Certification Bodies periodically to ensure that the stunning process does not kill the animals. The parameters of the electrical stunning include but are not limited to

the voltage, current and frequency. Although some standards introduce the range of acceptable parameters for specific animals, these standards also state that the stunning parameter record the animal periodically after the stunning process, whether the animal can gain consciousness after the stunning process. Carcass examination after slaughtering is also required to indicate if the animal is dead before slaughter. UAE.S993:2022 even requires monitoring the blood flow. If it is less than the normal amount of blood observed, it is automatically opted out of Halal product.

According to Islamic law, the animal's death shall be caused by slaughtering solely. Any acts before or after slaughtering that alter the death process of the animal are prohibited. Therefore, any further processing, including scalding / skin removal or evisceration, is not allowed before the animals are dead completely (Yardimci, 2019). To ensure this, GSO/UAE.S 993:2015, HAS 23103 and OIC/SMIIC 1 stipulate the bleeding period of poultry shall be at least 180 seconds. While MS 1500, UAE.S 993:2022 and MUIS HC S001 do not require minimum bleeding time as long as the animal is dead before further processing.

Slitting is the core of the slaughtering process that can be done either by humans or machines. Hand slaughtering is a process of killing animals manually using a knife operated by a human. In contrast, mechanical slaughtering is an automated slaughtering process performed by a machine. All the standards allow both hand and mechanical slaughtering. The last method is acceptable if there are proven that miss-cutting can be avoided, even according to HAS 23103, mechanical slaughtering can be used if the mistake of the slaughtering is below 1%.

One of the major differences in animal slaughtering is the slaughterman. MS 1500, HAS 23103, MUIS HC S001 and OIC/SMIIC 1 stated that the slaughterman must be an adult Muslim, while GSO/UAE.S 993 allows either an adult Muslim, Jew or Christian slaughterers. Additionally, HAS 23103 requires that the slaughterman be at least 18 years old.

5. Alcohol

Alcohol is any carbonic compound that contains one or more hydroxyl functional groups (-OH) connected to a carbon. Ethanol is one of the alcohol organic configurations containing

must be adjusted individually according to the condition of the slaughterhouse. To support this, the food manufacturer must examine and

two carbon atoms and one hydroxyl group. Ethanol is a compound that has intoxicating effects, it acts as a central nervous system depressant, an agent which reduces the functionality of the central nervous activity. It leads to slow down the brain responses and causes the feeling of being "drunk." (Pauzi et al., 2019).

From an Islamic perspective, there are two types of ethanol: *khamr* and non-*khamr*. *Khamr* is an Arabic word derived from *khamara*, meaning "to cover". It refers to any intoxicating substances and may cause losing ability to any individuals who consume it (Michalak & Trocki, 2006). By this definition, *khamr* includes all types of alcoholic beverages. Thus, *khamr* ethanol is any ethanol produced through alcoholic beverages fermentation, among others, beer, wine, vodka and whisky. While non-*khamr* ethanol is any ethanol not produced from alcoholic beverages fermentation. This ethanol can be produced by fermentation or synthetically (Mohammad Aizat Jamaludin et al., 2018).

According to Islamic Law, the consumption of alcohol is considered Haram (forbidden). In Islam, consuming alcohol is seen as a sin. It is prohibited as it leads to a loss of consciousness, resulting in a person committing immoral acts, harming themselves or others, and neglecting their religious obligations (Rassool, 2014). All standards agreed that *khamr* ethanol is considered non-Halal regardless of concentration and use. Regarding non-*khamr* ethanol, most standards determine the maximum limit of alcohol allowed in food products, although the permissible concentration varies among the standards. The permitted maximum ethanol concentration in different food products according to different standards, including HAS 2300, MS 1500, GSO 2538 and MUIS HC S001, are illustrated in. OIC/SMIIC has not published any standard determining the maximum limit of permissible ethanol in food products. Its standard is still being created, i.e., OIC/SMIIC CD 38 Maximum Limit for Residues of Ethyl Alcohol (Ethanol) in Food. However, according to OIC/SMIIC 1, Halal products shall not contain alcohol.

Table 3. Permissible alcohol/ethanol limits in various Halal Standards

Criteria	HAS 23000	MS 1500	GSO 2538	MUIS HC S001
Beverages dedicated for <i>khamr</i>	Strictly prohibited	Strictly prohibited	Strictly prohibited	Strictly prohibited
Intentionally added non- <i>khamr</i> ethanol in food and beverages.	No limit and safe	<0.5%	Not allowed	Not allowed
Non- <i>khamr</i> beverages	<0.5%	<1%	<0.1%	0.1%
Unintentional alcohol	End product <0.5% for beverage and no limit for food if it is medically safe.	<1%	Depending on the products, As shown on the Error! Reference source not found.	0.1%
Flavor and colorants	End product <0.5% for beverage and no limit for food if it is medically safe.	End product <0.5%	Depending on the products, As shown on the Error! Reference source not found.	0.5%, end product 0.1%
Fermented dairy (solid/paste)	No limit if it is medically safe	<1%	<0.3%	0.1%
References	(LPPOM MUI, 2021)	(DSM, 2019)	(GSO, 2021)	(MUIS, 2005)

Beverages dedicated for *khamr* are strictly restricted in all four standards, consistent with the Islamic prohibition on consuming alcoholic beverages. The intentionally added non-*khamr* ethanol in food and beverages has different limits across the standards. On the one side, HAS 23000 allows the use of non-*khamr* ethanol without any limit, provided it is considered safe. MS 1500 allows non-*khamr* ethanol in food and beverages but with a less than 0.5% limit. Conversely, GSO 2538 and MUIS HC S001 do not allow any intentionally added ethanol in food and beverages.

The upper limit of permissible ethanol in beverages also has different limits across the standards. HAS 23000 and MS 1500 permit non-*khamr* ethanol in beverages with limits of less than 0.5% and less than 1%, respectively. GSO 2538 and MUIS HC S001 have a lower limit of less than 0.1%.

Furthermore, alcohol could be in the end product even when alcohol is not used during the processing, which is called unintentional alcohol. It pertains to alcohol that may be present in food or beverages due to the manufacturing process or fermentation. HAS 23000 permits a maximum end product limit of less than 0.5% for beverages and no limit for food, provided it is medically safe. MS 1500 allows up to 1% of unintentional alcohol, whereas GSO's permissible limits depend on the product type, as shown in **Error! Reference source not found.**, with some limits as high as

0.5% and others as low as 0.02%. Similarly, MUIS HC S001 has a lower limit of 0.1% for unintentional alcohol.

Table 4. Maximum Limits of Ethyl Alcohol (ethanol) residues in foodstuff according to GSO 2538 (GSO, 2021)

Product	Upper Limit
Grape vinegar	1% v/v
All vinegar types except grapes vinegar	0.5% v/v
Sauces, ketchup (all kinds), drinks / concentrated juices, concentrates, food mixes prepared for manufacturing, and aromatic herbs oils.	0.5% v/v or v/w
Juices including different types of nectar, cocktails and drinks and ready-to-drink flavored water	0.1% v/v
Fresh or processed foods of meat, milk and grains legumes, oils, eggs, seafood spices and sweets.	0.3% v/v or v/w
raw materials such as protein concentrates, sugars Yeast, essential oils, raw cocoa and other similar raw material	0.5% v/v or v/w
Chocolates	0.02% v/w
Others	0.02% v/v

The flavor and colorants refer to food additives that may contain alcohol/ethanol but are not intended to have an intoxicating effect. HAS 23000 and MS 1500 permit maximum alcohol

content at the end product of less than 0.5%. Despite that, HAS 23000 allows alcohol in flavor without any limit on food, provided that it is medically safe. GSO 2358 allows a limit of less than 0.5% for the end product, with some exceptions, as shown in **Error! Reference source not found.**, where the permissible limit may be as low as 0.1%. MUIS HC S001 has a lower limit of 0.5% for flavor and colorants and a limit of 0.1% for the end product.

Finally, the fermented dairy (solid/paste) category pertains to dairy products undergoing fermentation. HAS 23000 has no limit on the permissible amount of alcohol/ethanol in fermented dairy products if it is medically safe. MS 1500 allows up to 1%, while GSO 2358 and MUIS HC S001 have a limit of less than 0.3% and 0.1%, respectively.

6. Vinegar

Vinegar is a versatile liquid used for centuries for its culinary, medicinal, and household applications. It is a dilute solution of acetic acid produced through the fermentation of ethanol by acetic acid bacteria. Vinegar can be made from various sources, including fruits, grains, and sugarcane, and the resulting flavors and aromas can vary greatly depending on the starting material and the fermentation process used (Singh, 2020).

Vinegar has many uses in cooking, such as flavoring, preserving, and tenderizing foods. It is also used as a natural cleaning agent due to its antimicrobial properties and ability to break down grease and grime. In addition, vinegar has been used for its medicinal properties, including aiding in digestion, reducing inflammation, and promoting weight loss (Kara et al., 2022).

From an Islamic point of view, there are specific guidelines regarding the use of vinegar. For vinegar to be considered Halal, it must be produced from permissible sources and not contain any haram (prohibited) substances. One of the key aspects of Halal vinegar is the process of *istihalah*, which refers to transforming a haram substance into a permissible one through a chemical change. In the case of vinegar, fermentation causes a chemical change in the starting material, converting the alcohol into acetic acid. This transformation is considered a form of *istihalah*, which renders the vinegar Halal and permissible for consumption (Mohammad Aizat Jamaludin et al., 2018).

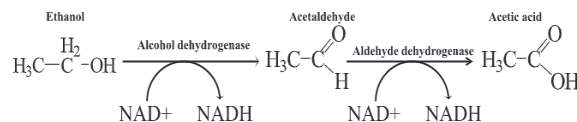


Fig 1. Conversion of ethanol (alcohol) to acetic acid (vinegar) (Jahangir et al., 2016)

Vinegar, as a fermented product, raises concerns regarding its compliance with Islamic dietary laws due to the possibility of alcohol production during the fermentation process. Alcohol, specifically ethanol, is generated through the fermentation of fruits, grains, sugar, or starch in the presence of yeast, and if its concentration is high enough, it may have an intoxicating effect, making it prohibited for Muslims (M. A. Jamaludin et al., 2016). Therefore, Halal food and beverage standards have been established in Muslim countries, setting permissible alcohol content limits.

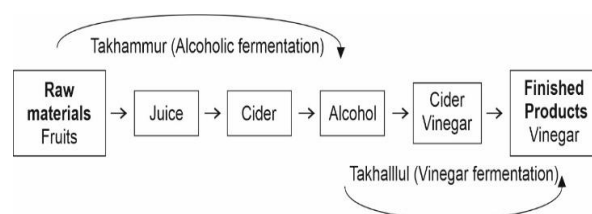


Fig. 2. Fermentation process of takhammur and takhallul (M. A. Jamaludin et al., 2016)

The process of vinegar production involves two stages of fermentation: *takhammur* (winemaking) and *takhallul* (vinegar making). *Takhammur* is an alcoholic transformation from carbohydrate-rich materials through a fermentation process. While *takhallul* is a conversion of alcohol to acetic acid (M. A. Jamaludin et al., 2016).

The critical Halal point of vinegar is the source and the ethanol content. Both requirements must be fulfilled to obtain Halal vinegar. The GSO 2538, MUIS HC S001 and OIC SMIIC 1 forbid any vinegar from alcoholic beverages. Consequently, although the *istihalah* process occurs, vinegar made from wine, beer, whisky and similar beverages is considered non-Halal. In contrast, HAS 23000 and MS 1500 deemed that vinegar from alcoholic beverages is Halal. However, MS 1500 also requires natural fermentation, a fermentation without any additives must occur. Consequently, if any additive is used, vinegar from alcoholic beverages will not be considered as Halal.

Additionally, the permitted ethanol content in vinegar is regulated differently according to several standards and summarized in the Table 5.

Table 5. The critical Halal point of vinegar according to different Halal standards

Halal Standard	Vinegar from <i>khamr</i>	Maximum ethanol concentration in vinegar
MS 1500	Halal with natural fermentation	1.0%
GSO 2538	Haram	0.5%, except grape vinegar 1.0%
HAS 23000	Halal	0.5%
MUIS HC S001	Haram	0.1%
OIC/SMIIC 1	Haram	Not determined

7. Insects

Nowadays, the request for more sustainable food in particular proteins and fats have a growing demand worldwide, among the proposed sustainable food resources an increasing interest has been touting insects. The one that is used to treat food waste, require less space, water, and

regenerate less gas emissions(Cerritos, 2009; Güneş & Özkan, 2018; Tajudeen, 2020; Van Huis, 2013, 2020; Van Huis & Oonincx, 2017). However, the acceptance of insects as a source of proteins and fats is depending on the region and human culture(Van Huis, 2013).

According to the EU legislations, by adding silkworm (*Bombyx mori*) to the list of the authorized species. Since November 2021, eight insect species are allowed to be reared and processed under certain conditions. Among these insect species, black soldier fly (*Hermetia illucens*), yellow mealworm (*Tenebrio molitor*) and super mealworm larvae (*Zophobasmorio*) have been predominantly studied as a source of protein, fats and other nutrients, due to their interesting qualitative and quantitative amino-acids, fatty-acids and minerals profiles (Aguilar-Toalá et al., 2022; Benzertiha et al., 2020; de Souza-Vilela et al., 2019; Mwangi et al., 2018; Roos, 2018). Among other insects, lac insect (*Kerria lacca*) is promoted as a source of natural safe resin which is applied in cosmetics, pharmaceuticals, and a surface coating in different industries (Sharma et al., 2020).

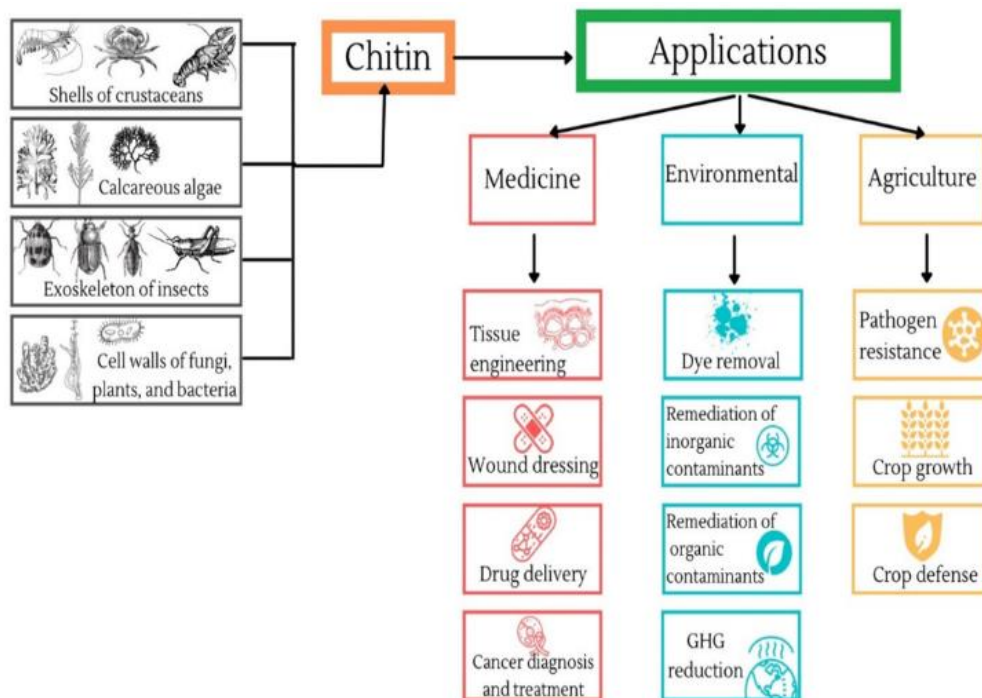


Fig. 3. Different sources of chitin application (Dave et al., 2021)

In addition, silkworm (*Bombyx mori*) is reported to be one of the famous sources of different

materials that have a diverse application (Cao et al., 2016). According to Khosropanah et al.,

(2022), silkworm has various biomedical applications. It is reported by the same authors that silk contains fibroin and sericin and has been used to treat various tissues of the human body (bone, skin, nerve...etc.). Furthermore, insects are reported to have high amount of chitin in their exoskeleton (Benzertiha et al., 2020; Finke, 2007; Zhu et al., 2016). According to several authors chitin is widely used in several industries. Because of unique nature of the chitin by having innate water-solubility allows it to be used in a wide range of applications such as agriculture, medical, and environmental (Dave et al., 2021; Pokhrel et al., 2015; Yang, 2011).

7.1. Consumption of insects in Islam

Insects in Arabic “*hasharat*” in the book of *fiqh* are referred to insects, rodents, reptiles. Arabs before Islam were well accustomed to locust consumption (Tajudeen, 2020). When Islam came, locust was further consumed and considered Halal in which Prophet Muhammad (PBUH) said “There are two dead (animals) that are permitted to us (to consume without slaughter); the fish and the locusts” (Ibn Majah, Chapters on Hunting, Hadith No.3218).

It is clear about the consumption of locust in Islam. However, scholars and Islamic jurists differ in opinion about other types of insects. For instance, Hanafi school consider all type of insects as non-Halal (Yasin, 2007). According to the Maliki school of thought, it is considered permissible to consume all types of *hasharat*, including insects, except those that may pose a health risk or are deemed repulsive by people (Rahim, 2018; Tajudeen, 2020). Regarding the Shafi’i and Hanbali schools, they have a specific approach, unlike Hanafi and Maliki schools that have a more general approach. However, both schools have differences in some categories of *hasharat*. Both schools view all insects (except locusts) as dirty, and thus, not Halal (Tajudeen, 2020).

The acceptance of food colorants such as carminic acid (E120), and/or glazing agent such as shellac (E904), in Muslim food industries is questionable due to the different opinions of the Islamic schools of thoughts.

7.2. Halal standards and insects’ consumption

OIC/SMIIC 1:2019 standard (Clause no. 5.1.1.1)

mentioned that, grasshopper is among the Halal species, and in clause no. 5.1.1.2. mentioned that the repulsive animals such as insects and those that are forbidden to be killed, like honeybee are non-Halal. Malaysian standard (MS 1500:2019, Clause no. 4.5.1.1.1) mentioned that pests, cockroaches, centipedes, scorpions, wasps and other similar type of animals are non-Halal. Those animals that are forbidden to be killed in Islam, like honeybee are non-Halal. Singapore Standard (MUIS-HC-S001, Clause no. A.5.2) considers locust and grasshopper and non-poisonous land carbs as Halal. UAE and GSO standards Standard (GSO/UAE.S 2055-1:2015, Annex 1) mentioned that all types of insects, worms and animals forbidden to be killed by Islamic rules such as ants, bees, except for locusts and unavoidable bee parts falling in honey are non-Halal. MUI (Indonesia HAS 23201) Halal Standard on Materials, includes cochineal coloring (E120) among the Halal materials as well as the crabs and worms, if it is not poisonous.

8. Conclusion

The increasing demand of the Halal products drives the food manufacturer to comply the Halal standards due to its potential commercial advantages. However, there are several Halal standards across the globe which cause no single universal Halal standards accepted worldwide. There are some specific differences of the requirements in each Halal standard which generates confusion to food manufacturers. This study attempts to address the differences and the similarities of five Halal standards: MS 1500, GSO 2055, HAS 23000, MUIS HC S001 and OIC/SMIIC 1. Surprisingly, the differences between the Halal standards are not limited to non-principle requirements; rather, they extend to fundamental criteria, where one standard may accept something that another standard strictly prohibit.

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Halal standardi širom svijeta: Komparativna studija

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ABSTRACT

Ključne riječi:

halal hrana, dijetetske smjernice, islamska regulativa, halal industrija, usklađeni standard

Halal standardi za hranu odnose se na skup smjernica i propisa za muslimane koji reguliraju pripremu, rukovanje i konzumaciju hrane. Ove standarde su objavile različite zemlje i organizacije širom svijeta, što je dovelo do raznolikog raspona halal standarda. Različite objave halal standarda u različitim zemljama predstavljaju izazov za industriju da se uskladi s jedinstvenim standardom, što je rezultiralo složenim i nedosljednim krajolikom. Ova studija ima za cilj usporediti i analizirati glavne halal standarde koji se koriste u cijelom svijetu, uključujući MS 1500 iz Malezije, GSO 2055-1 iz Vijeća za suradnju u Zaljevu, HAS 23000 iz Indonezije, MUIS HC S001 iz Singapura i OIC/SMIIC 1 iz Organizacije zemalja Islamske suradnje (OIC). Ova studija će usporediti različite aspekte glavnih halal standarda uključujući, ali ne ograničavajući se na metode koje se koriste za omamljivanje životinja, mehaničko klanje, klanje od strane ljudi iz knjige, upotrebu i koncentraciju alkohola, insekte i njihove nusproizvode, te preradu octa. Rezultati ove studije omogućit će bolje razumijevanje razlika u halal standardima i njihov utjecaj na globalnu halal industriju. Očekuje se da će ova studija pomoći sudionicima da razumiju te standarde i doprinijeti razvoju usklađenih halal standarda u budućnosti.

JOURNAL OF HALAL QUALITY AND CERTIFICATION

Microbiological status of Qurbani sheep carcasses after home slaughter

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ABSTRACT

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Qurbani, sheep, microbiological examination, bacteria, prevention.

With the rise of the worldwide Muslim population, it is necessary to take steps to prevent foodborne illnesses during the slaughtering of animals at Eid-al-Adha. In Bosnia and Herzegovina, slaughtering is done at licensed slaughterhouse, but also at home, increasing the risk of contamination that can be dangerous and life threatening, especially for children, pregnant women or for older ill people. The sacrificed animals must be in good health, but the risk of pathogenic bacteria is still present, as they are commonly found on the skin and in the gastrointestinal tracks of the animals. However, little research has been done to determine the microbiological status of Qurbani carcasses. To gather this necessary data and determine the level of bacterial contamination, a microbiological examination of sheep's carcasses shortly after home slaughter was performed. The research was done in Visoko, Bosnia and Herzegovina, and the 30 samples were analyzed for presence of six different bacteria: *Salmonella spp.*, *Listeria spp.*, *E. coli*, *Enterobacteriaceae*, *Aerobic mesophilic bacteria* and *Staphylococcus spp.*, using ISO-certified methods. While *Salmonella* was not detected and the count of *Enterobacteriaceae* and *Aerobic mesophilic bacteria* was within the legally allowed limits, the detection of *Listeria spp.*, *E. coli*, and *Staphylococcus spp.* points to the need for more detailed testing of carcasses after slaughter. To assure the safety of Qurbani carcasses, it is necessary to focus more on preventative measures during home slaughter, as well as the education of people doing the home slaughtering.

1. Introduction

Eid-al-Adha (Festival of Sacrifice) is one of two major holidays in Islam. The focus of the Eid-al-Adha celebration is a sacrifice of an animal, such as sheep, cow, goat, or camel in the name of Allah (Martin, 2004). One-third of the meat is given to the poor people, one-third is kept for themselves and their family, and the last part is given to their neighbors (Vlaisavljević, 2020). In Bosnia and Herzegovina, the slaughter is organized in two ways. It can be done at registered slaughterhouses, but the tradition of home slaughter still persists. Home slaughter is

often done by the owner of the animal who lacks the proper knowledge and training regarding the prevention of food born illnesses. In European union, such method of slaughter is not legal. Other countries, such as the UK allow which permits slaughter by the Islamic method, but just in case that there is a licensed Muslim slaughterman and a licensed slaughterhouse under veterinary supervision law The Welfare of Animals (Slaughter or Killing) Regulations 1995 (Statutory Instrument (SI) No 1995/731 as amended by SI No 1999/400)). Slaughtering of healthy animals in fields, farms and other similar places is not permitted (Yunes, 2006).

Sacrificed animals have to be of a certain age and in a good health (Martin, 2004), which decreases the possibility of infection diseases, but improper dressing procedures increases the risk of cross contamination of the meat with pathogenic bacteria. The slaughter without veterinary inspection and in-home environment brings with it some risks that conventional meat does not have. Observing home slaughter in Bosnia and Hercegovina revealed that many common preventative measures are not followed enough, such as the cleaning and disinfections of knives used for slaughter and dressing procedures and that the same knives are used on more than one carcass without disinfection. Data regarding the hygienic conditions in which home slaughters are performed is insufficient, so the goal of our study was the microbiological examination of sheep shortly after slaughter to determine the level of bacterial contamination of carcasses during manipulation after slaughter.

2. Materials and methods

The samples, consisting of cotton swabs, were collected in Visoko, a city in Bosnia and Herzegovina, during Eid-al-Adha, in July 2021. In total, 30 samples from sheep carcass were collected, swabbing the area of neck muscle, trunk, and thigh muscles. The collected samples were stored in the refrigerator until delivered during the same day when a microbiological analysis was performed. The microbiological analysis of collected samples was performed in the laboratory of the Hygiene & Technology department at the Faculty of Veterinary Medicine-University of Sarajevo. The samples were analyzed for presence of six different bacteria: *Salmonella spp.*, *Listeria spp.*, *E. coli*, *Enterobacteriaceae*, *Aerobic mesophilic bacteria* and *Staphylococcus spp.* The analysis was performed in accordance to ISO standard methods (Eicher et al., 1997).

Table 1. ISO standard methods

MICROORGANISM	ISO METHOD
<i>Salmonella spp.</i>	BAS EN ISO 6579-1:2018
<i>Listeria spp.</i>	BAS EN ISO 11290-1:2018
<i>Escherichia coli</i>	BAS EN ISO 16649-2:2008
<i>Enterobacteriaceae</i>	BAS EN ISO 21528-2:2018
<i>Aerobic mesophilic bacteria</i>	BAS EN ISO 4833-1:2014
<i>Staphylococcus spp.</i>	BAS EN ISO 6888-1 / 2005/Amd 1 :2005

3. Results

We detected the presence of 5 out of 6 types of bacteria we tested for: *Listeria spp.*, *E. coli*, *Enterobacteriaceae*, *Aerobic mesophilic bacteria* and *Staphylococcus spp.* *Salmonella spp.* was not detected in any of the samples, while only one sample was free of *E.coli*.

Table 1. Results - mean, min and max value (log cfu/cm²)

MICROORGANISM	MEAN VALUE (log cfu/cm ²)	MAX VALUE (log cfu/cm ²)	MIN VALUE (log cfu/cm ²)
<i>Salmonella spp.</i>	/	/	/
<i>Listeria spp.</i>	1.66x10 ²	Sample No 17: 5.9x10 ²	No 29: 0.9x10
<i>E. coli</i>	0.71x10 ²	No 24: 9.1x10 ²	No 1: /
<i>Enterobacteriaceae</i>	2.3	No 29: 2.41	No 22. 25: 2.15
<i>Aerobic mesophilic bacteria</i>	3.63	No 29: 3,72	No 22.25:3.54
<i>Staphylococcus spp.</i>	9.03x10 ²	No 18: 3.6x10 ³	No 2: 4x10

The obtained results of the *Aerobic mesophilic bacteria*, *Enterobacteriaceae* and *Salmonella spp.* were compared to the limits posed by the (COMMISSION REGULATION (EC) No 2073/2005 on microbiological criteria for foodstuffs. All results were in the accordance to the current legislative, as *Salmonella spp.* was not detected in any samples, while the samples would be classified as acceptable when taking in account the detected number of *Aerobic mesophilic bacteria* and *Enterobacteriaceae*, indicating the need for better hygiene and good manufacturing practices.

Table 3. Permitted values of bacteria in the sample

Food categories	Microorganisms	Sampling plan		Limits	
		n	c	m	M
Carcass of sheep	<i>Salmonella spp.</i>	50	2	Absent in the tested area of the body	
Carcass of sheep	<i>Aerobic mesophilic bacteria</i>			3.5 log cfu/cm ² log of daily average	5.0 log cfu/cm ² log of daily average
Carcass of sheep	<i>Enterobacteriaceae</i>			1.5 log cfu/cm ² log of daily average	2.5 log cfu/cm ² log of daily average

n – number of elementary units comprising the sample
 c – number of sample units with values between m and M
 m – lower limit value
 M – maximum allowed value
 Conformational testing didn't reveal the

presence of *Listeria Monocytogenes* or *Staphylococcus aureus*.

Table 4. Research results

MARK (SHEEP)	Salmonella spp.	Listeria spp. (cfu/cm ²)	E. coli (cfu/cm ²)	Enterobacteriaceae(log cfu/cm ²)	Aerobic mesophilic bac. (logofu/cm ²)	Staphylococcus spp. (cfu/cm ²)
1	X	2x10	X	2,30	3,64	1,8x10 ³
2	X	3x10	9x10	2,28	3,63	4x10
3	X	1,7x10 ³	9x10	2,36	3,68	8,20x10 ³
4	X	4x10	0,1x10	2,34	3,66	7,4x10 ³
5	X	7x10	1x10	2,32	3,65	7,2x10 ³
6	X	8x10	1x10	2,34	3,66	4,8x10 ³
7	X	5x10	3x10	2,26	3,60	4,10x10 ³
8	X	5,2x10 ³	5x10	2,23	3,59	2x10 ³
9	X	1,1x10 ³	2x10	2,23	3,61	9,3x10 ³
10	X	7x10	2x10	2,28	3,63	4,6x10 ³
11	X	2,2x10 ³	3x10	2,30	3,64	1x10 ³
12	X	1,1x10 ³	2x10	2,23	3,61	1x10 ³
13	X	3,6x10 ³	1,7x10 ³	2,23	3,61	1,2x10 ³
14	X	2,7x10 ³	4x10	2,26	3,60	8,3x10 ³
15	X	7x10	4x10	2,18	3,56	8x10 ³
16	X	4,7x10 ³	5x10	2,34	3,66	1,5x10 ³
17	X	5,3x10 ³	5x10	2,34	3,66	1,5x10 ³
18	X	1,4x10 ³	1,8x10 ³	2,32	3,65	3,5x10 ³
19	X	2x10	1x10	2,34	3,66	2,5x10 ³
20	X	6x10	1x10 ³	2,32	3,65	4,3x10 ³
21	X	6x10	2x10	2,18	3,56	3,2x10 ³
22	X	7x10	4x10	2,15	3,54	5,4x10 ³
23	X	1,3x10 ³	3,8x10 ³	2,32	3,65	6x10 ³
24	X	3,3x10 ³	3,1x10 ³	2,32	3,65	2,1x10 ³
25	X	3x10 ³	1,2x10 ³	2,15	3,54	7x10 ³
26	X	1,4x10 ³	1x10	2,38	3,70	1x10 ³
27	X	1,2x10 ³	6x10	2,38	3,70	8x10 ³
28	X	6x10	5x10	2,38	3,70	6,3x10 ³
29	X	0,9x10	0,4x10	2,41	3,72	4,3x10 ³
30	X	3x10 ³	1,6x10 ³	2,34	3,67	1x10 ³
Mean value		Mean value:1,7x10 ³	Mean value:1x10 ³	Mean value:2,3	Mean value:3,63	Mean value:8,4x10 ³
Min value						

4. Discussion

All the examined carcasses were in accordance with the maximal allowed values set by the Food Safety Agency of Bosnia and Herzegovina. *Salmonellaspp* was not detected in any of the samples we tested. Phillips et al. (2001) determined a 0.1% percentage of *Salmonella spp.* positive samples while Nouichi and Hamdi (2012) reported one contaminated ovine carcass (1.11%). These differences could be attributed to a larger sample size.

Aerobic mesophilic bacteria were detected on every carcass and our results (3.63 log cfu/cm²) are in accordance with those of Martinez et al. (2010), (3.53 log cfu/cm²) who also obtained their results by swabbing. The percentage of carcasses in which *Enterobacteriaceae* were detected was higher in our study (100%) than in other studies, like these of Martinez et al (2010) (82.8%). Saad et al. (2011) found value of *Enterobacteriaceae* of 3.3 to 3.9 log cfu/cm², higher than the values we detected.

In addition to *Enterobacteriaceae* and *Aerobic mesophilic bacteria* which the carcasses must be

tested for, our research also detected the presence of other potentially pathogenic microorganisms. *Staphylococcus spp.* as well as *Listeria spp.* were found in every of our 30 samples, while 29 samples tested positive for *E.coli*. These bacteria can pose a significant risk to human health, but the current legislation does not require the testing for their presence in carcasses during slaughter. *S. aureus* was detected on 32.6% of samples by Mørk et al. (2012), while Kocaman and Sarimehmetoğlu (2017) detected a lower occurrence of *Listeria spp.* at 30.7%, which can still pose a significant risk to human health.

The food born illnesses related to Qurbani meat are relatively rare, with only a few examples described in literature (Adamson et al., 2021). Animals must be healthy before they are slaughtered, which helps prevent the cases of food born illnesses related to their meat. This does not account for the common occurrences of cross contamination which lead to the detection of pathogenic bacteria on the carcasses. However, in Bosnia and Herzegovina, meat, especially Qurbani meat is traditionally cooked

for a long time at lower temperatures (Rosser et al., 2022). This means that the meat served is mostly free of all bacteria and safe for human consumption. The possibility of cross contamination during preparation indicates the need for better education of people doing the slaughter. The home slaughter of Qurbani during the Eid is a part of tradition of Bosnia and Herzegovina, but with the modern knowledge of risks related to meat and food born illnesses, traditions must evolve. The key to the survival of this type of slaughter is the education of those who are doing it on the subjects of food safety, cross contamination and proper hygienic practices.

5. Conclusion

The food born illnesses related to Qurbani meat are relatively rare, with only a few examples described in literature (Adamson et al., 2023). Animals must be healthy before they are slaughtered, which helps prevent the cases of food born illnesses related to their meat. This does not account for the common occurrences of cross contamination which lead to the detection of pathogenic bacteria on the carcasses. However, in Bosnia and Hercegovina, meat, especially Qurbani meat is traditionally cooked for a long time at lower temperatures (Rosser et al., 2022). This means that the meat served is mostly free of all bacteria and safe for human consumption. The possibility of cross contamination during preparation indicates the need for better education of people doing the slaughter. The home slaughter of Qurbani during the Eid is a part of tradition of Bosnia and Hercegovina, but with the modern knowledge of risks related to meat and food born illnesses, traditions must evolve. The key to the survival of this type of slaughter is the education of those who are doing it on the subjects of food safety, cross contamination and proper hygienic practices.

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Mikrobiološko stanje trupova kurbanskih ovaca nakon kućnog klanja

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PODACI O RADU

SAŽETAK

Ključne riječi:
Kurban, ovce, mikrobiološki pregled, bakterije, prevencija.

Sa porastom muslimanske populacije širom svijeta, neophodno je poduzeti korake da se spriječe bolesti koje se prenose hranom tokom klanja životinja na Kurban-bajrama. U Bosni i Hercegovini klanje se obavlja u ovlaštenim klaonicama, ali i kod kuće, čime se povećava rizik od kontaminacije koja može biti opasna po život, posebno za djecu, trudnice, starije i bolesne osobe. Žrtvovane životinje moraju biti dobrog zdravlja, ali rizik od patogenih bakterija je i dalje prisutan, jer se one obično nalaze na koži i u gastrointestinalnom traktu životinja. Međutim, malo je istraživanja urađeno da bi se utvrdio mikrobiološki status kurbanskog mesa. Da bi se prikupili ovi neophodni podaci i utvrdio nivo bakterijske kontaminacije, izvršeno je mikrobiološko ispitivanje ovčijih trupova ubrzo nakon kućnog klanja. Istraživanje je obavljeno u Visokom, Bosna i Hercegovina, a 30 uzoraka analizirano je na prisustvo šest različitih bakterija: Salmonella spp., Listeria spp., E. coli, Enterobacteriaceae, aerobne mezofilne bakterije i Staphylococcus spp., koristeći ISO certificirane metode. Dok salmonela nije otkrivena, a broj Enterobacteriaceae i aerobnih mezofilnih bakterija je bio u zakonski dozvoljenim granicama, detekcija Listeria spp., E. coli i Staphylococcus spp. ukazuje na potrebu detaljnijeg ispitivanja trupova nakon klanja. Da bi se osigurala sigurnost kurbanskog mesa, potrebno je više pažnje posvetiti preventivnim mjerama tokom kućnog klanja, kao i edukaciji ljudi koji obavljaju kućno klanje.

JOURNAL OF HALAL QUALITY AND CERTIFICATION

Microbiological Correctness of Fish with Reference to *Listeria Monocytogenes* in The Context of Importance to Halal Production

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ABSTRACT

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The finding of microorganisms, especially pathogens, in food determines the correctness of food and the possibility of using it in human nutrition. According to the current legislation of Bosnia and Herzegovina, food of animal origin is considered microbiologically defective if they contain an impermissible number of pathogens, among which *Listeria monocytogenes* occupies a special place in the context of public health. Listeriosis in humans is characterized by gastrointestinal disorders, the occurrence of meningitis and miscarriages in pregnant women. The aim of the research is to examine the prevalence and seasonality of *Listeria monocytogenes* in rainbow trout (*Oncorhynchus mykiss*) in order to confirm the halal quality of the product. In the production and processing of fish, critical control points were monitored and the presence of *Listeria monocytogenes* was determined. A total of 320 samples of rainbow trout sampled at different stages of production and processing were analyzed, using microbiological methods according to the international standard BAS EN ISO 11290-1/A1:2005. The total number of rainbow trout samples where *Listeria monocytogenes* was detected was 3,12%. Prevention includes checking the status of water and food that fish consume, as well as work and production hygiene. It is necessary to avoid cross-contamination, one of the main ways of contamination in production. Fish contaminated with pathogens, such as *Listeria monocytogenes*, is not allowed for human consumption due to its harmfulness to human health, and therefore such fish does not meet the criteria of a halal product.

1. Introduction

Listeria monocytogenes is a ubiquitous bacterium in nature, so the mode of transmission is quite broad. The relationship between this bacterium, the environment, animals, humans and food is not entirely clear, but the fact that it

is transmitted through food and can be dangerous to human and animal health, positions it as a priority in the field of food safety (Aala et al. 2023; Samanta & Choudhary 2019). Protection against pathogens is based on prophylaxis (Ji et al. 2023). This is also stated in the reports of the *Food and Drug Administration* (FDA), the *Food Safety and Inspection Service*

(FSIS) and the American Department of Agriculture (USDA) with the aim of introducing a zero tolerance level on the presence of *L. monocytogenes* in ready meals (Antoci et al. 2021; Buchanan et al. 2017).

In a public health context, *Listeria monocytogenes* causes the disease listeriosis (Schoder et al. 2023). Clinically, we differentiate between invasive and non-invasive forms of listeriosis. Invasive listeriosis is characterized by a more severe clinical picture, mostly noticeable in children, pregnant women, the elderly and people with weakened immunity due to the presence of some chronic disease (Jordan et al. 2015). Invasive listeriosis is characterized by a high degree of mortality, while non-invasive listeriosis is dominated by febrile listeriosis gastroenteritis (Rivera-Izquierdo et al. 2023). This gastroenteritis occurs as part of listeriosis epidemics with symptoms in the form of diarrhea, fever, headache, muscle pain, etc., which occur after a short incubation period (Islam et al. 2023). In order to prevent contamination with *Listeria monocytogenes* in the production and processing of fish, attention should be paid to the microbiological status of the water and food consumed by the fish, as well as to the hygiene of work and production. It is necessary to pay attention to cross-contamination as one of the basic ways of contamination of final products in production chains (Zakrzewski et al. 2023).

The term halal in Islam represents everything that is permitted, and this also applies to food products that Muslims can consume. The opposite of the term halal is the term haram, which means anything that is forbidden in Islam. When we say that something is forbidden (haram), we can also say that it is not healthy for the human body, because according to Islamic laws, non-halal food is considered to transmit diseases. Halal standards dictate that food must meet all regulations on health, hygiene and sanitary correctness, that it does not contain ingredients that Muslims are forbidden to consume, and that no Sharia-prohibited raw materials and means were used in production

(Nazaruddin et al. 2023). Halal food must not contain pathogenic microorganisms (Maqsood & Ayyub 2023). In order for the fish to meet the criteria of a halal product, it must also be microbiologically correct. Therefore, the aim of this research is to examine the presence of *Listeria monocytogenes* in rainbow trout (*Oncorhynchus mykiss*) in order to confirm the halal quality of the product.

2. Material and methods

2.1. Research area

Rainbow trout (*Oncorhynchus mykiss*) samples were collected in two facilities, from a fish farm and a fish processing plant. The first facility is implemented with Halal/HACCP standards (facility A), while the second facility is not certified/registered in the veterinary-sanitary control system and does not comply with standards (facility B). Sampling was done in two seasons: spring-summer and autumn-winter. Isolation and identification of *Listeria monocytogenes* was carried out in the Laboratory for Microbiological Testing of Foodstuffs, Animal Feed and Items of General Use at the Veterinary Faculty of the University of Sarajevo. Sample analysis was done in accordance with the cold chain according to BAS EN ISO 11290-1/A1:2005.

2.2. Materials, samples of rainbow trout (*Oncorhynchus mykiss*)

The research included 320 samples of edible rainbow trout (*Oncorhynchus mykiss*). Seasonal sampling was carried out in such a way that in the spring-summer season 80 samples of edible rainbow trout were sampled in facilities A and B. The same sampling procedure of 80 samples of edible rainbow trout was repeated in both facilities in two seasons: spring-summer and autumn-winter (Table 1). The samples were cut with a sterile knife in the amount of 25.0 ± 0.5 g. and stored in vacuum plastic bags at a temperature of 4 ± 2 °C.

Table 1. Number of rainbow trout samples according to facility type and sampling season

Number of samples/season	Number of samples according to object type and sampling season	
	Facility A (Halal/HACCP)	Facility B (without Halal/HACCP)
Number of samples/spring-summer	(n=80)	(n=80)
Number of samples/autumn-winter	(n=80)	(n=80)
Total	(n=160)	(n=160)

2.3. Research methods

For the preparation of samples of edible rainbow trout (*Oncorhynchus mykiss*) for microbiological analysis, the substrates prescribed by the method BAS EN ISO 6887-1:2005 (ISO 6887-1 2005) and 6887-3:2005 (ISO 6887-3 2005) were used. All samples were transferred to a sterile Stomacher bag to which 225 mL of physiological peptone solution was added. All samples were serially diluted ten times. *Listeria* selective agar plates according to Ottaviana and Agosta (ALOA agar) (ISO) (VWR Chemicals BDH, Leuven, Belgium) were used for the cultivation of samples (100 µL). Incubation was done for 48-72 h, at 37°C.

For the isolation and identification of *Listeria monocytogenes*, the substrates prescribed by the method BAS EN ISO 11290-1/A1:2005 – Horizontal method for the detection and counting of *Listeria monocytogenes* – Part 1 (ISO 11290-1 2005) were used. The following substrates and diagnostics were used to perform this method: Half Fraser broth with supplements (Conda lab), Fraser broth (Conda lab), *Listeria* agar according to Ottaviana and Agosti (ALOA agar) (Conda lab), PALCAM agar (Conda lab), Tryptone soy yeast extract agar (TSYEA) (Conda lab), Tryptone soy yeast extract broth (TSYEB) (Conda lab), Sheep blood agar (Conda lab), Carbohydrate utilization broth (rhamnose and xylose) (Conda lab), Motility agar (Motility agar) (Conda lab), Christie, Atkins, Munch-Petersen) test strains, Phosphate-buffered saline (PBS), 0.85% NaCl solution. The following reference strains were used for isolation and identification of *L. monocytogenes* and quality control of microbiological media: *Listeria*

monocytogenes 4b (WDCM 00021), *Escherichia coli* (WDCM 00012), *Staphylococcus aureus* (NCTC 1803), *Rhodococcus equi* (NCTC 1621), *L. innocua* (ATCC 33090) and *L. ivanovii* (ATCC 19119).

3. Results

The results of research on the presence of *Listeria monocytogenes* in samples of edible rainbow trout (*Oncorhynchus mykiss*) in a facility with implemented Halal/HACCP standards (facility A) and in a facility that is not certified/registered in the veterinary-sanitary control system and does not comply with standards (facility B) are presented in tables 2 and 3 and graphs 1-4. In the facility with implemented HACCP and Halal standards, positive samples of rainbow trout for *Listeria monocytogenes* were recorded only in the spring-summer season at the slaughter and evisceration line (2/20, 10%). In a facility that does not comply with Halal standards, the highest number of positive samples for *L. monocytogenes* was recorded in both seasons on the slaughter and evisceration lines. The largest number of positive samples was recorded in the spring-summer (3/20, 15%), and slightly less in the autumn-winter (1/20, 5%). In the spring-summer season, positive samples were also recorded in a container with ice (1/15, 6.66%), frozen fish (1/15, 6.66%), while in the autumn-winter season, positive samples were from fish farms (1 /15, 6.66%) as well as fish from cassettes ready for transport (1/15, 6.66%).

Table 2. Representation and seasonality of *Listeria monocytogenes* in samples of edible rainbow trout in a facility with implemented Halal/HACCP standards (facility A)

Location/number of samples	Number of positive samples (%)	
	Spring-summer	Autumn-winter
Fish farms (n=15)	0 (0.00)	0 (0.00)
Containers with ice (n=15)	0 (0.00)	0 (0.00)
Slaughter and evisceration line (n=20)	2 (10.00)	0 (0.00)
Fish from the cache ready for transport (n=15)	0 (0.00)	0 (0.00)
Frozen fish (n=15)	0 (0.00)	0 (0.00)
Total (n=80)	2 (2.5)	0 (0.00)

Of the total number of rainbow trout samples in establishments with implemented Halal/HACCP standards (facility A), positive samples for the presence of *Listeria monocytogenes* were recorded only in the spring-summer season (2/80, 2.5%). In the case of samples taken in a

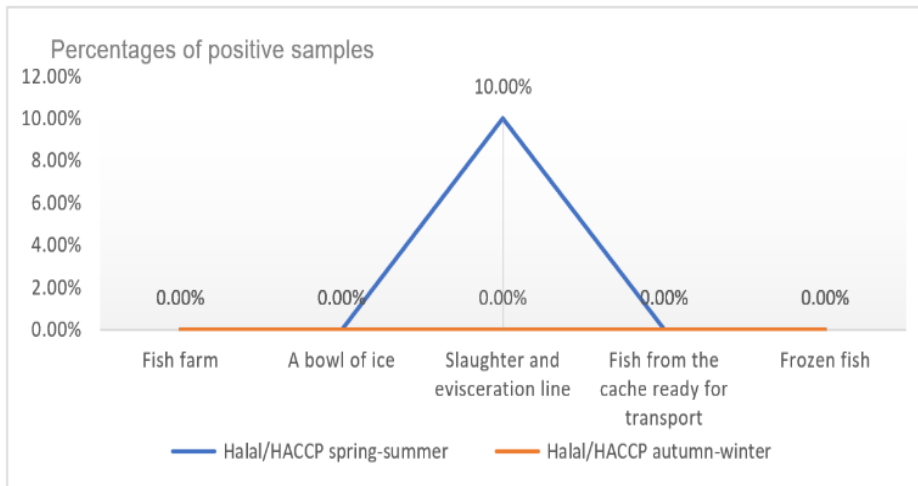
facility that does not comply with Halal/HACCP standards (facility B), the total number of positive samples was recorded in the spring-summer season (5/80, 6.25%) and almost half as much in the fall-winter season (3/ 80, 3.75%).

Table 3. Representation and seasonality of *Listeria monocytogenes* in samples of edible rainbow trout in a facility without implemented Halal/HACCP standards (facility B)

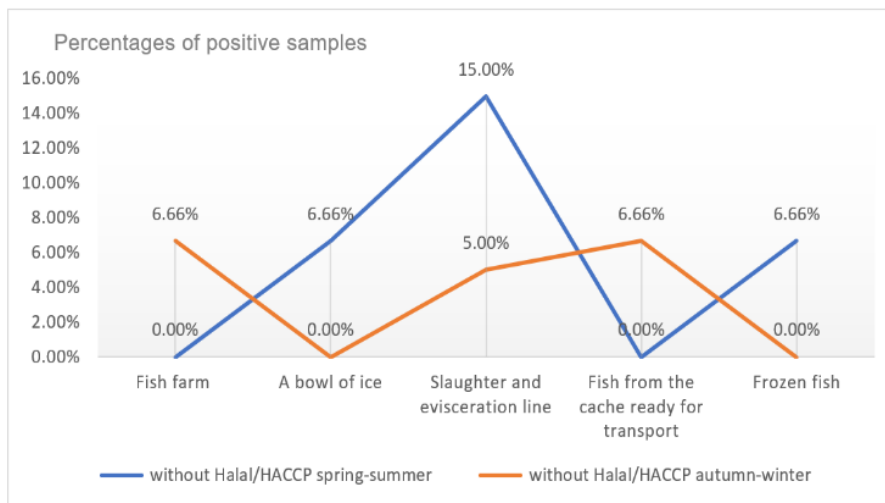
Location/number of samples	Number of positive samples (%)	
	Spring-summer	Autumn-winter
Fish farms (n=15)	0 (0.00)	1 (6.66)
Containers with ice (n=15)	1 (6.66)	0 (0.00)
Slaughter and evisceration line (n=20)	3 (15.00)	1 (5.00)
Fish from the cache ready for transport (n=15)	0 (0.00)	0 (0.00)
Frozen fish (n=15)	1 (6.66)	0 (0.00)
Total (n=80)	5 (6.25)	3 (3.75)

Of the total analyzed rainbow trout samples collected in facilities with and without Halal standards (Facilities A, B), the total number of

samples with *Listeria monocytogenes* is (10/320, 3.12%) (Graph 1-4).



Graph 1. Comparative presentation of the results of the presence and seasonality of *Listeria monocytogenes* in rainbow trout samples in a facility with implemented Halal/HACCP (facility A)



Graph 2. Comparative presentation of the results of the presence and seasonality of *Listeria monocytogenes* in rainbow trout samples in a facility without implemented Halal/HACCP (facility B)

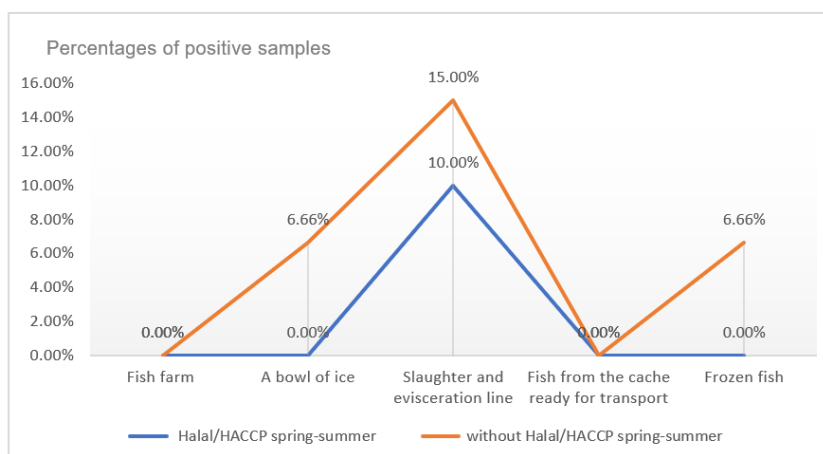


Chart 3. Comparative presentation of the results of positive samples for *Listeria monocytogenes* in facilities with and without implemented Halal/HACCP in the spring-summer season (facility A, B)

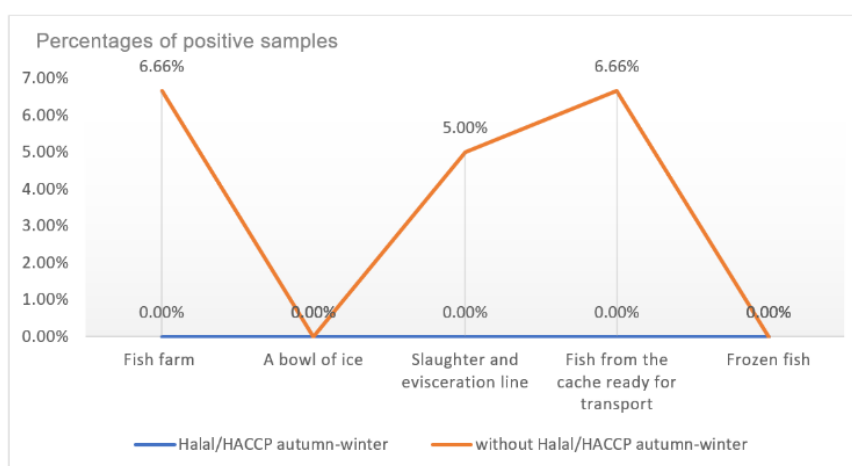


Chart 4. Comparative presentation of the results of positive samples for *Listeria monocytogenes* in facilities with and without implemented Halal/HACCP in the autumn-winter season (facility A, B)

4. Discussion

The aim of the research is to examine the prevalence and seasonality of *Listeria monocytogenes* in rainbow trout (*Oncorhynchus mykiss*) in order to confirm the halal quality of the product. It was observed that in the spring-summer season in facilities with implemented Halal/HACCP standards (facility A), a smaller percentage of positive samples for *Listeria monocytogenes* was present, while a complete absence of positive samples was recorded in the fall-winter season. The amount of *Listeria monocytogenes* in samples of edible rainbow trout increased in the spring-summer season, which confirms the seasonality of this pathogenic bacterium, which is especially visible in positive samples collected in facilities that are not certified/registered in veterinary-

sanitary control and do not comply with Halal/HACCP standards (Facility B), which indicates that halal products are of better quality in terms of sanitary quality. In contrast to the samples of edible rainbow trout that were collected in facilities with implemented Halal/HACCP standards, in facilities without implemented Halal/HACCP standards, positive samples are present in both seasons. All of the above indicates that halal products have a better microbiological status. Good microbiological quality is achieved with the help of Halal standards and with the help of the HACCP concept that includes *Good Manufacturing Practice* (GMP) and *Good Hygienic Practice* (GHP). A similar study of the prevalence and seasonality of *Listeria monocytogenes* in edible rainbow trout (*Oncorhynchus mykiss*) was conducted in Croatia, where Rožman et al. (2016) state that in facilities with implemented

Halal and HACCP standards, they obtained negative results in the autumn-winter season.

Listeria monocytogenes was detected in samples of edible rainbow trout in a facility without implemented Halal/HACCP standards in the spring-summer season, when 80 samples were analyzed. One positive sample was from the ice bin (1/15, 6.66%), followed by frozen fish (1/15, 6.66%), while three positive samples were from the slaughter and evisceration line (3/20, 15%). The total percentage of positive samples for *Listeria monocytogenes* from that sampling period was (6.25%) (Table 3). The results of this study are in the range of values reported in similar studies, so Rahimi et al. (2011) state that *Listeria* spp. isolated in (7.5%) samples of raw and frozen fish, of which *Listeria monocytogenes* was present in (1.9%) of the tested samples, while Lakičević et al. (2015) reported that (12.4%) positive samples for *L. monocytogenes* were present in samples of fresh fish, cold and hot smoked trout. Some authors state that *Listeria* spp. can be present in smoked products up to (39.4%), while recent research records the percentage of positive samples in smoked products in the range of (0-12%) (Rotariu et al. 2014). Similar results were found in fresh and frozen fish samples by other authors in Japan, Ryu et al. (1992), Sweden, Parihar et al. (2008) and India, Dhanashree et al. (2003). Research indicates that hygienic and sanitary standards in production processes reduce the contamination of final products. Contamination reduction is also achieved by proper fish processing, thermal processing and freezing (Rotariu et al. 2014; Ziarati et al. 2022). It should be emphasized that the ice used in cold chains must be free of *L. monocytogenes* (Wang et al. 2023).

Listeria monocytogenes was detected in the autumn-winter season in rainbow trout samples from a facility without implemented Halal/HACCP, where out of a total of 80 samples taken, it was positive (3.75%). Out of the total number of samples from farms with rainbow trout, one positive sample was detected for *Listeria monocytogenes* (1/15 6.66%), at the slaughter and evisceration line (1/20.5%) and fish from caches ready for transport (1/15, 6.66%) (Table 3). The results shown in Tables 2, 3 and 4 agree with the results of other authors, who also found a different number of positive fish samples for the presence of *Listeria monocytogenes* (17.2%) Jeyasekaran et al. (1996), as well as Kuzmanović et al. (2011) who found positive samples of fresh fish, fish products and seafood for the presence of *L.*

monocytogenes (1.92%).

By comparing the detection results of *Listeria monocytogenes* in samples of rainbow trout from a facility with Halal and HACCP standards in the spring-summer and autumn-winter period, it is evident that in the spring-summer period the percentage of positive results is (10%), while in the same facility no *L. monocytogenes* was detected in the autumn-winter period (Graph 1). Graph 2 shows a comparison of the detection results of *L. monocytogenes* in rainbow trout samples from a facility without Halal and HACCP standards in the spring-summer and autumn-winter periods. The total percentage of positive samples from the spring-summer period (28.32%) was higher compared to the percentage of positive samples from the same facility from the autumn-winter period (18.32%), which may suggest that increased surveillance is needed in the summer period. By comparing the results of detection of *Listeria monocytogenes* in rainbow trout samples from a facility with implemented Halal/HACCP standards in the spring-summer and fall-winter season, it is evident that in the spring-summer season the percentage of positive results (10%), while in the same facility no *L. monocytogenes* in the autumn-winter period (Graph 1). Graph 2 shows a comparison of the detection results of *L. monocytogenes* in rainbow trout samples from a facility without implemented Halal/HACCP standards in the spring-summer and fall-winter seasons (Graph 3). The largest number of positive samples for *L. monocytogenes* was detected at the slaughter and evisceration line, because according to Papadopoulos et al. (2010), at that sampling point contact with fish by processors increased. In fish processing facilities, subsequent contamination occurs as a consequence of evisceration, gill removal, shell cleaning, filleting, which agrees with our results. Elischerova et al. (1979) report the results of research from Slovakia, where the largest number of positive samples for *L. monocytogenes* were on the hands of workers during the smoking process (14.5%) and the meat cutting process (8.9%). Graph 4 compares the results of rainbow trout samples from establishments with and without implemented Halal/HACCP standards in the fall-winter season. Although positive results are evident in the facility without implemented standards at three sampling sites (Slaughter and evisceration line, containers with ice, frozen fish and fish from cache ready for transport) (18.32%), compared to the facility with implemented Halal/HACCP standards where *L.*

monocytogenes was not detected, but the difference was not statistically significant, but was the result of non-systemic variable factors. Sanitation procedures can reduce or destroy a significant amount of *Listeria monocytogenes* from the production line as well as from equipment, but recontamination can occur shortly after starting a new production cycle. This is linked to the formation of a biofilm that increases resistance and allows the bacterial cell to survive in unfavorable microenvironmental conditions (Mazaheri et al. 2023). Given that *Listeria monocytogenes* quickly adapts to environmental conditions, contamination during production, distribution and retail cannot be ruled out, which poses a challenge in controlling *L. monocytogenes* despite the application of all prescribed sanitary measures (Bolívar et al. 2023). Production processes and facilities must be under control and hygienic-sanitary processing, in order to reduce the possibility of product recontamination to the lowest level during production (Nguyen Trang et al. 2023).

5. Conclusion

The research confirmed the presence of *Listeria monocytogenes* in samples of rainbow trout (*Oncorhynchus mykiss*) from ponds and processing facilities, which indicates the possibility of contamination of the final products. Positive samples at the slaughter and evisceration line indicate the obligation of constant supervision and implementation of hygienic and sanitary measures in accordance with Halal/HACCP standards. Fish contaminated with pathogens, such as *Listeria monocytogenes*, is not allowed for human consumption due to its harmfulness to human health, and therefore such fish does not meet the criteria of a halal product.

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Mikrobiološka ispravnost riba sa osvrtom na *listeria monocytogenes* u kontekstu značaja na halal proizvodnju

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Naučni rad

PODACI O RADU

SAŽETAK

Ključne riječi:

halal kvaliteta,
kalifornijska pastrmka,
Listeria monocytogenes.

Nalaz mikroorganizama, patogena u hrani određuje ispravnost hrane i mogućnost korištenja u ljudskoj ishrani. Prema važećem zakonodavstvu Bosne i Hercegovine, namirnice animalnog porijekla smatraju se mikrobiološki neispravnim ako sadrže nedozvoljeni broj patogena, među kojima u kontekstu javnog zdravstva posebno mjesto zauzima *Listeria monocytogenes*. Listeriozu kod ljudi karakterišu gastrointestinalni poremećaji, pojava meningitisa i pobačaji kod trudnica. Cilj istraživanja je ispitati zastupljenost i sezonalnost *Listeria monocytogenes* u kalifornijskoj pastrmci (*Oncorhynchus mykiss*) u svrhu potvrde halal kvaliteta proizvoda. U proizvodnji i preradi ribe praćene su kritične kontrolne tačke i utvrđeno je prisustvo *Listeria monocytogenes*. Analizirano je 320 uzoraka kalifornijske pastrmke uzorkovane u različitim fazama proizvodnje i prerade, uz korištenje mikrobioloških metoda prema standardu BAS EN ISO 11290-1/A1:2005. Ukupan broj uzoraka kalifornijske pastrmke kod kojih je otkrivena *Listeria monocytogenes* iznosi 3,12%. Prevencija uključuje provjeru stanja vode i hrane koju ribe konzumiraju, kao i higijenu rada i proizvodnje. Potrebno je izbjeći unakrsnu kontaminaciju, jedan od osnovnih načina kontaminacije u proizvodnji. Riba koja sadrži patogene, među kojima je i *Listeria monocytogenes*, nije dozvoljena za ljudsku ishranu zbog štetnosti po zdravlje ljudi, te stoga takva riba ne ispunjava kriterije halal proizvoda.

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The Influence Of The Halal Concept On The Microbiological Correctness Of Meat And Meat Products

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Keywords:

Halal concept, meat industry, microbiological integrity of products

Halal food is permissible food for Muslims. Whether something will be halal largely depends on the primary production process as well as processing, which must be in accordance with halal standards. Production chains must have a halal certificate, and final products must be marked with the halal logo. Halal food safety criteria are largely in line with the health criteria of the HACCP concept. Therefore, the aim of this paper was to examine the microbiological status of meat and meat products in establishments with implemented Halal and HACCP concept and to compare them with establishments that are not certified, i.e. in which the specified control concepts are not implemented. For this purpose, a total of 600 (300+300) samples of meat and meat products from two production chains were analyzed in accordance with international and national standards. The largest number of positive samples came from facilities without an implemented Halal concept with a total number of aerobic mesophilic bacteria (21/300, 7%), *Listeria monocytogenes* (6/300, 2%), *Escherichia coli* (17/300, 5.66%), *Staphylococcus aureus* (16/300, 5.33%), while *Salmonella* and *Clostridium* were not isolated. The application of Halal criteria for food in combination with the HACCP concept contributes to better microbiological correctness of products in the Halal meat industry.

INTRODUCTION

According to Islamic law, the food eaten by Muslims must be Halal (permissible/lawful), and it bears the label "Tayyib", which means that Halal food must be correct, of good quality and safe (Najmi et al. 2023; Wilson 2014). Muslims are allowed to consume only halal food. Some

foods are completely prohibited. The opposite of halal is non-halal or haram (forbidden) food. For Muslims, the animals that are forbidden to eat are pork, corpses, blood, blood products, carnivores, birds of prey, reptiles, insects, etc. Islamic messages apply to all countries of the Islamic world (Annisa et al. 2023; Beik et al. 2021). Halal and tayyib meat is a guarantee for Muslims that halal food meets the halal food

criteria for food: that it does not contain parts or substances taken or extracted from animals that are prohibited for consumption by Muslims, that it does not contain substances declared as impurities, that halal food is not prepared, processed, produced using utensils, equipment and/or machines containing impure substances according to Islamic laws, and that during preparation, processing or storage it did not come into contact with haram food and haram products (Aghwan 2018; Bujang et al. 2018).

Halal requirements are based on Islamic law/Sharia, and all regulations are found in the Holy Quran. Every aspect of the food chain (from farm to table) must comply with halal requirements, including procurement, processing and serving of food (Rusydziana et al. 2023). Whether certain food will be halal or haram, produced in different food industries, also depends on the production method followed in the production chain, which is defined by halal standards. The problem with halal standards is that they are not consistent in all countries of the Islamic world (Demirci et al. 2016). Meat production has the most requirements that must be respected in accordance with Islamic laws. Halal requirements are largely universal in all Islamic countries when it comes to animal welfare. Animals must be treated as humanely as possible during housing, transport and slaughter (Aini et al. 2022). Also, halal meat industries must have a halal certificate, which is a guarantee for a halal product (Wannasupchue et al. 2023).

Halal meat is defined as meat obtained from the slaughter of a halal animal and processed in accordance with Islamic dietary criteria for food (Hadith no. 668 of Sahih Bukhari, ed. 3, book 44). Taking halal is Allah's command and the basic practice of all Muslims (Alzeer et al. 2018). However, the Holy Qur'an addresses all people regardless of religion, not only Muslims, to seek halal food, because it is for their benefit, because the Islamic criteria for food includes both the hygienic (health) aspect of food safety and medicinal properties (Baharuddin et al. 2015). The Halal industry is one of the fastest growing industries in the world. The main factor driving the halal industry is the high demand from Muslim consumers and the community for halal food. According to Abdullah et al. (2021) what Muslim consumers want is halal food that is made according to halal requirements in accordance with the Shariah and that is healthy. The primary concept of halal (permissible), that

is, food that Muslims can consume in accordance with Islamic laws, is zero tolerance for non-halal products (forbidden) along the entire food chain (Lestari et al. 2023). There is a noticeable demand for halal food among non-Muslims who recognize the quality of halal products (Ambali & Bakar 2014). According to Sthapit et al. (2023) non-Muslims see the motives for consuming halal food in the quality and hygienic-health correctness of halal food. According to Abdullah et al. (2021) the combination of hygiene and health principles of the HACCP concept in the production of halal food contributes to better quality and safety of halal products. Critical points in the production of halal meat can be determined in accordance with the health principles of the HACCP concept in order to improve the quality and safety of halal food. Therefore, the aim of this work was to examine the microbiological integrity of meat and meat products in establishments with implemented Halal and HACCP concept and establishments that are not certified, in order to find the connection between halal food criteria, halal certification and the HACCP concept, which contributes to greater safety and health correctness of halal meat and meat products.

MATERIAL AND METHODS

Research area

Samples of meat and meat products were collected from two production chains located on the territory of Bosnia and Herzegovina, from processing units (slaughterhouse/meat processing), certified according to Quality management systems – Requirements BAS EN ISO 9001:2017 (ISO 9001 2017) and Environmental Management Systems – Requirements with instructions for use of BAS EN ISO 14001:2017 (ISO 14001 2017) and national Bosnian halal standards Halal food - requirements and measures BAS 1049:2010 and HACCP requirements for food quality and safety management facility "A", as well as those that are not certified/registered facility "B". Microbiological analysis was carried out in the Laboratory for microbiological testing of food products, animal feed and items of general use of the Veterinary Faculty, University of Sarajevo, according to BAS EN ISO 112901/A:2005 (ISO 112901 2002).

Samples of meat and meat products

The research collected a total of 600 (300+300) different samples of meat and meat products: prepared meat (n=100; 50+50), minced meat (n=100; 50+50), chopped, shaped meat (kebabs, hamburgers and fig.) (n=100; 50+50), sausages (Bosnian sudžuk) (n=100; 50+50), smoked products-semi-permanent (smoked beef) (n=100; 50+50), dried meat products-permanent (beef prosciutto) (n=100; 50+50). Therefore, the sampling was carried out in such a way that 300 samples of meat and meat products were taken in facility "A". Then the same sampling procedure of 300 samples was repeated in facility "B". The samples were appropriately labeled and stored under vacuum in sterile bags at a temperature of 4°C with variations of $\pm 2^{\circ}\text{C}$ and delivered to the laboratory for further analysis.

Methods for determining the number of bacteria

Preparation of samples for microbiological analysis was done in accordance with Preparation of test samples, initial suspensions and decimal dilutions for microbiological tests - Part 1: General rules for the preparation of initial suspensions and decimal dilutions BAS EN ISO 6887-1:2005 and 6887-3:2005 (ISO 6887 2005). All microbiological analyzes were performed according to the methods of the BAS EN ISO standard: Microbiology of the food chain – Horizontal method for the detection and enumeration of *Listeria monocytogenes* and of *Listeria* spp. – Part 1: Detection method BAS EN ISO 11290-1:2018 (ISO 11290-1 2018); Microbiology of the food chain – Horizontal method for the detection, enumeration and serotyping of *Salmonella* – Part 1: Detection of *Salmonella* spp. – Amendment 1 Broader range of incubation temperatures, amendment to the status of Annex D, and correction of the composition of MSRV and SC BAS EN ISO 6579-1/A1:2022 (ISO 6579-1 2022); Microbiology of food and animal feeding stuffs – Horizontal method for the detection of *Escherichia coli* O157 – Amendment 1: Annex B: Result of interlaboratory studies BAS EN ISO 16654/A1:2018 (ISO 16654-1 2018); Microbiology of the food chain – Horizontal method for the enumeration of coagulase-positive staphylococci (*Staphylococcus aureus* and other species) – Part 1: Method using Baird-Parker agar medium BAS ISO 6888-1:2022 (ISO 6888-1 2022); Microbiology of food and

animal feeding stuffs – Horizontal method for the enumeration of sulfite-reducing bacteria growing under anaerobic conditions BAS ISO 15213:2008 (ISO 15213 2008); Microbiology of the food chain – Horizontal method for the detection and enumeration of *Enterobacteriaceae* – Part 2: Colony-count technique BAS EN ISO 21528-2:2018 (ISO 21528-2 2018); Microbiology of the food chain – Horizontal method for the enumeration of microorganisms – Part 1: Colony count at 30 degrees C by the pour plate technique BAS EN ISO 4833-1:2014 (ISO 4833-1 2014).

RESULTS

The results of research on the presence of *Listeria monocytogenes*, *Salmonella* spp., *Escherichia coli*, *Staphylococcus aureus*, *Enterobacteriaceae*, sulfite-reducing clostridia and the sum of aerobic mesophilic bacteria from samples of meat and meat products in a facility with implemented Halal and HACCP concept (facility "A") and in a facility without Halal and HACCP concepts (facility "B") are shown in Table 1. The largest number of positive samples was in group "B" facilities that did not meet the microbiological criteria with the total number of positive samples for the presence of aerobic mesophilic bacteria (21/300, 7%), *Listeria monocytogenes* (6/300, 2%), *Escherichia coli* (17/300, 5.66%), *Staphylococcus aureus* (16/300, 5.33%), while *Salmonella* and *Clostridium* bacteria were not isolated. The largest number of positive samples for aerobic mesophilic bacteria was recorded in shredded meat, kebabs, hamburgers and in samples from establishments without implemented Halal and HACCP concepts (16/50, 32%). A greater number of positive samples for *Listeria monocytogenes* were recorded in samples of ready-made meat (2/50, 4%), sausages (Bosnian sudžuk) (2/50, 4%), while a smaller number was recorded in samples of smoked products-semi-permanent (smoked beef meat) (1/50, 2%), dried meat products-permanent (beef prosciutto) (1/50, 2.00%). *Escherichia coli* was detected in all samples of meat and meat products, and the largest number of positive samples was in chopped shaped meat, kebabs, hamburgers in establishments without implemented Halal and HACCP concepts (9/50, 18%). *Staphylococcus aureus* was detected in all samples from establishments without implemented Halal and HACCP concepts, with the exception of one

positive sample of meat from an establishment with implemented Halal and HACCP concepts (1/50, 2%) from chooped shaped meat gabbers, hamburgers and processed meat (Table 1).

PROCESSED MEAT																		
	TESTED BACTERIAL SPECIES																TOTAL NUMBER/SAMPLES	%
	Enterobacteriaceae				Coagulase positive staphylococci				Listeria monocytogenes				Aerobic mesophilic bacteria					
	NEGATIVE	%	POSITIVE	%	NEGATIVE	%	POSITIVE	%	NEGATIVE	%	POSITIVE	%	NEGATIVE	%	POSITIVE	%		
FACILITY WITH HALAL/HACCP	48	96	2	4	49	100	1	2	50	100	0	0	50	100	0	0	50	100
FACILITY WITHOUT HALAL/HACCP	43	86	7	14	47	94	3	6	48	96	2	4	45	90	5	10	50	100
MINCED MEAT																		
	TESTED BACTERIAL SPECIES																TOTAL NUMBER/SAMPLES	%
	Escherichia coli				Coagulase positive staphylococci				Listeria monocytogenes				Aerobic mesophilic bacteria					
	NEGATIVE	%	POSITIVE	%	NEGATIVE	%	POSITIVE	%	NEGATIVE	%	POSITIVE	%	NEGATIVE	%	POSITIVE	%		
FACILITY WITH HALAL/HACCP	49	98	1	2	50	100	0	0	50	100	0	0	50	100	0	0	50	100
FACILITY WITHOUT HALAL/HACCP	42	84	8	16	47	94	3	6	50	100	0	0	43	86	7	14	50	100
CHOPPED SHAPED MEAT (GABBERS, HAMBURGERS)																		
	TESTED BACTERIAL SPECIES																TOTAL NUMBER/SAMPLES	%
	Escherichia coli				Coagulase positive staphylococci				Listeria monocytogenes				Aerobic mesophilic bacteria					
	NEGATIVE	%	POSITIVE	%	NEGATIVE	%	POSITIVE	%	NEGATIVE	%	POSITIVE	%	NEGATIVE	%	POSITIVE	%		
FACILITY WITH HALAL/HACCP	49	98	1	2	49	98	1	2	50	100	0	0	50	100	0	0	50	100
FACILITY WITHOUT HALAL/HACCP	41	82	9	18	46	92	4	8	50	100	0	0	42	84	8	16	50	100
SAUSAGE (BOSNIAN SUZUK)																		
	TESTED BACTERIAL SPECIES																TOTAL NUMBER/SAMPLES	%
	Enterobacteriaceae				Coagulase positive staphylococci				Listeria monocytogenes				Aerobic mesophilic bacteria					
	NEGATIVE	%	POSITIVE	%	NEGATIVE	%	POSITIVE	%	NEGATIVE	%	POSITIVE	%	NEGATIVE	%	POSITIVE	%		
FACILITY WITH HALAL/HACCP	49	98	1	2	50	100	0	0	50	100	0	0	50	100	0	0	50	100
FACILITY WITHOUT HALAL/HACCP	48	96	2	4	47	94	3	6	48	96	2	4	49	98	1	2	50	100
SMOKED PRODUCTS - SEMI-DURABLE (SMOKED BEEF)																		
	TESTED BACTERIAL SPECIES																TOTAL NUMBER/SAMPLES	%
	Enterobacteriaceae				Coagulase positive staphylococci				Listeria monocytogenes				Aerobic mesophilic bacteria					
	NEGATIVE	%	POSITIVE	%	NEGATIVE	%	POSITIVE	%	NEGATIVE	%	POSITIVE	%	NEGATIVE	%	POSITIVE	%		
FACILITY WITH HALAL/HACCP	49	98	1	2	50	100	0	0	50	100	0	0	50	100	0	0	50	100
FACILITY WITHOUT HALAL/HACCP	47	94	3	6	48	96	2	4	49	98	1	2	50	100	0	0	50	100
DRY MEAT PRODUCTS - PERMANENT (BEEF PROSCIUT)																		
	TESTED BACTERIAL SPECIES																TOTAL NUMBER/SAMPLES	%
	Enterobacteriaceae				Coagulase positive staphylococci				Listeria monocytogenes				Aerobic mesophilic bacteria					
	NEGATIVE	%	POSITIVE	%	NEGATIVE	%	POSITIVE	%	NEGATIVE	%	POSITIVE	%	NEGATIVE	%	POSITIVE	%		
FACILITY WITH HALAL/HACCP	50	100	0	0	50	100	0	0	50	100	0	0	50	100	0	0	50	100
FACILITY WITHOUT HALAL/HACCP	50	100	0	0	49	98	1	2	49	98	1	2	50	100	0	0	50	100

Salmonella spp. and Sulfite-reducing clostridia were not detected in the tested samples

Table 1. Microbiological integrity of meat and meat products from facilities with and without implemented Halal/HACCP concept (facilities A, B)

DISCUSSION

The aim of this work was to examine the microbiological correctness of meat products and meat products in establishments with implemented Halal and HACCP concept and in establishments that are not certified, in order to

find the connection between Halal food criteria, Halal certification and the HACCP concept, for the sake of a better understanding of this issue. Products from facility "A" showed a significantly better microbiological status of the final products. Also, it is generally noticeable that fresh meat has a higher presence of bacteria

compared to processed smoked meat. *Listeria monocytogenes* was not detected in any product from the facility with the implemented Halal and HACCP concept, in the products from facility "A". In products originating from facility "A", the number of aerobic mesophilic bacteria corresponded to legal norms and the number of these bacteria is generally lower compared to products from facility "B". Salmonella species as well as sulfite-reducing clostridia were not detected in any production plant. The potential of the HACCP concept, which includes *Good Manufacturing Practice* (GMP) and *Good Hygienic Practice* (GHP), has long been recognized in international standards as a good food safety concept. The halal concept related to halal food is not significantly different from the HACCP concept, but the halal food criteria are unknown to many when it comes to the world food market. It is considered that the application of the HACCP concept in the Halal meat industry improves the safety of Halal products and opens the door to the world food market (Abdullah et al. 2021; Demirci et al. 2016). Halal traditional food in Bosnia and Herzegovina can also increase gastronomic tourism. In addition, having a Halal certificate increases the guarantee for a Halal product. According to Žunić & Nezirović (2022), Halal national gastronomy, especially the autochthonous dishes of Bosnia and Herzegovina and Sarajevo, can be an important segment of tourist offer and culture.

Bujang et al. (2018) in their systematic review study, with the help of various literature, studied published articles on the microbiological status of meat and meat products for the presence of indicator microorganisms: *Escherichia coli*, *Staphylococcus aureus*, *Salmonella* spp. and more important food contaminants *Clostridium* spp., where they came to the conclusions that some elements of tayyib differ from the rules of halal certification that define a halal product. They also state that Halal tayyib meat includes better quality, hygiene and safety of Halal products. Halal must include sanitary procedures as a form of food safety, with a guarantee of halal and tayyib quality (Raheem & Demirci 2018). In a systematic review study on the impact of the HACCP concept on halal food safety, Wahyuni et al. (2019) included a review of 120 articles from 1990 to 2018 to present their findings on Halal food safety, as well as the possibility of developing more rigorous Halal

food safety assurance solutions so that Halal food meets all criteria in the world market. Sani & Dahlan (2015) in their research on Halal food criteria for food produced in Malaysia found that international measures that include the HACCP concept improve the safety of Halal products, which is consistent with our results.

In a study conducted in the United States of America examining the microbiological status of halal beef in two American slaughterhouses, Al-Mahmood et al. (2021) state that out of a total of 432 beef carcass samples (before and after evisceration) and 59 working surfaces were tested for the presence of indicator microorganisms. The number of aerobic bacteria, the number of bacteria from the *Enterobacteriaceae* family, the total and generic number of coliform bacteria-*Escherichia coli* were analyzed and all samples were negative. The number of microorganisms in the carcasses of Halal beef was within the limits allowed in accordance with the microbiological guidelines prescribed by the United States Department of Agriculture (USDA) for food safety, and all of the above supports the excellent microbiological status of Halal beef, which is also our research ready-made Halal meat confirmed.

In another study from the United States, Al-Mahmood (2023) reports on food safety and sanitation practices in small-scale halal and non-halal beef slaughterhouses. Data were collected on hygiene practices in 45 halal slaughterhouses and 51 non-halal slaughterhouses that agreed to participate in the research. Research has shown that international food safety criteria do not differ significantly from criteria for halal food safety. In ensuring hygiene, halal and non-halal slaughterhouses used similar hygiene and sanitation procedures. Halal slaughterhouses most often used a combination of cold and hot water (180°C) and organic acid (31.1%), while non-halal slaughterhouses used only hot water (180°C). In all halal and non-halal slaughterhouses, a microbiological examination of the beef carcass was performed for the presence of indicator pollutants: generic number of *Escherichia coli* (100%). The results of the mentioned survey can be informative, but also applicable in finding ways to improve food safety. The above data also indicate that there are no deficiencies in sanitary practice that would problematize the microbiological status of halal food from the world market.

CONCLUSION

Based on the obtained results, it can be concluded that products produced in plants with implemented Halal and HACCP concepts are microbiologically more correct than products produced in plants without implemented Halal and HACCP concepts. The application of Halal nutritional criteria for food in combination with the HACCP concept contributes to better microbiological correctness of products in the Halal meat industry.

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Uticaj halal koncepta na mikrobiološku ispravnost mesa i mesnih prerađevina

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Naučni rad

PODACI O RADU

SAŽETAK

Ključne riječi:

*halal koncept,
higijenska ispravnost
proizvoda,
mikrobiološka
sigurnost, legislativa*

Halal hrana je dozvoljena hrana za muslimane. Da li će nešto biti halal u velikoj mjeri zavisi od primarnog procesa proizvodnje kao i prerade što mora biti u skladu sa halal standardima. Proizvodni lanci moraju imati halal certifikat, a finalni proizvodi moraju biti označeni halal logom. Kriterijumi bezbjednosti halal hrane su u velikoj mjeri u skladu sa zdravstvenim kriterijima HACCP koncepta. Stoga je cilj ovog rada bio ispitati mikrobiološki status mesa i mesnih prerađevina u objektima sa implementiranim Halal i HACCP konceptom i uporediti ih sa objektima koji nisu certificirani, tj. u kojima nisu implementirani navedeni koncepti kontrole. U tu svrhu analizirano je ukupno 600 (300+300) uzoraka mesa i mesnih prerađevina iz dva proizvodna lanca u skladu sa međunarodnim i nacionalnim standardima. Najveći broj pozitivnih uzoraka poticao je iz objekata bez implementiranog Halal koncepta sa ukupnim brojem aerobnih mezofilnih bakterija (21/300, 7%), *Listeria monocytogenes* (6/300, 2%), *Escherichia coli* (17/300, 5.66%), *Staphylococcus aureus* (16/300, 5.33%), dok *Salmonella* i *Clostridium* nisu izolovane. Primjena Halal prehrambenih kriterija za hranu u kombinaciji sa HACCP konceptom doprinosi boljoj mikrobiološkoj ispravnosti proizvoda u industriji Halal mesa.

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Hummus - Traditional Halal Dish from the Middle East

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ABSTRACT

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Hummus is a vegetable protein-lipid dish with a high satiety index, prepared from tahini and chickpeas. It was eaten by the forefather of all religions, Abraham or, among Muslims, Ibrahim a.s. Hummus is popular in most Arab countries and in Israel, and is gaining more and more followers in Western countries as well. The fundamental terms used to comment on the halal status of a product are halal (permitted), haram (forbidden), and meshbuh (questionable).

Aim of the paper: The purpose of this paper is to provide a brief nutritional overview of hummus, as well as an outline of the requirements for the commercial production of halal hummus.

Materials and methods: This paper compared the nutritional composition and ingredient list of six commercially available hummus products. A haram analysis was conducted based on the halal norm HRN BAS 1049:2010.

Results and discussion: The caloric value of hummus ranges from 231 to 295 kcal, while the total fat content in these products ranges from 19 to 24 g, saturated fat from 1.5 to 3 g, carbohydrates from 6.7 to 11 g, sugars from 0.2 to 2.2 g, fiber from 3 to 7.5 g, protein from 3.9 to 8.6 g, and salt from 0.5 to 1.63 g. Although calorie counting is the traditional approach to weight management, using nutrient density standards can help individuals have a higher quality diet. Compared to other spreads and dips, hummus has a higher Naturally Nutrient Rich (NNR) rating.

Based on HRN BAS 1049:2010, humus is considered low risk for haram since its ingredients are mostly of plant origin, although some additives used in commercial production may be synthetic. Haram analysis is conducted to identify haram critical control points (*HrCCP*) and establish preventive measures to avoid haram contamination of the final product.

Conclusion: Hummus is a nutritionally balanced dish that belongs to the low-risk category in terms of halal. However, adequate supervision of *HrCCP* is necessary to ensure the halal status of the product.

1. Introduction

1.1. Hummus

Traditional hummus is a dip or spread made from cooked, pureed chickpeas mixed with

tahini, olive oil, lemon juice, and spices. There are a variety of other forms of hummus on the market or bean-based dips that are called hummus but do not follow the traditional hummus recipe- each containing unique

ingredients which may or may not contribute to nutrient intakes and/or have benefits beyond basic nutrition (Wallace et al, 2016). Main ingredients are chickpeas and sesame.

The chickpea (*Cicer arietinum* L.), commonly known as the garbanzo bean, is one of the earliest cultivated legumes, with 9,500-year-old remains found in the Middle East (Bewley et al., 2006). Domesticated chickpeas have been found at preceramic Neolithic sites in Turkey and the Levant, particularly at Çayönü, Hacilar and Tell es-Sultan (Jericho). Chickpeas then spread to the Mediterranean around 6000 BC, and to India around 3000 BC (Perman et al., 2005). There are two main varieties of chickpea: the Kabuli type with light-coloured seeds and the dark Desi type with smaller seeds. India is the world's leading producer of chickpea (Wallace et al, 2016). Chickpea is used as an important ingredient in Mediterranean and Middle Eastern cuisine, where it is mainly found in hummus. It also plays an important role in Indian cuisine and is used in salads, soups and stews as well as curries.

Chickpea is a good source of carbohydrates and protein, the quality of protein being better than that of other legumes, and although it contains small amounts of fats, it is rich in nutritionally important unsaturated fatty acids such as linoleic and oleic acids. Ca, Mg, P and especially K are also present in chickpea seeds. Chickpeas are a good source of important vitamins such as riboflavin, niacin, thiamin, folic acid, and the vitamin A. Chickpeas have several potential health benefits and, in combination with other legumes and grains, could have beneficial effects on some major human diseases such as cardiovascular disease, type 2 diabetes, digestive disorders, and some cancers (Jukanti i sur., 2012)

Sesame (*Sesamum indicum* L.), a member of the Pedaliaceae family, is an erect annual herb commonly known as sesamum, benniseed, or simsim. It is one of the oldest and most traditional oilseed crops, valued for its high-quality oil. According to archaeological evidence, sesame cultivation descended from wild populations native to South Asia, and its cultivation was established in South Asia from the time of the Harappan civilization, spreading westward to Mesopotamia before 2000 BC (Fuller, 2003). Dried whole sesame seeds contain 573 kilocalories and are composed of 5% water, 23% carbohydrate (including 12% fibre), 50% fat, and 18% protein (USDA, 2018).

The major fatty acids are oleic acid (35 to 50%), linoleic acid (35 to 50%), palmitic acid (7 to 12%), stearic acid (3 to 6%). Due to the high content of linoleic acid, sesame oil is a valuable nutritional product (Egbekun and Ehieze, 1997) (Guerra et al. 1984). Tahini, also known as tahina, is a spice commonly used in Middle Eastern cuisine. It is made by grinding and frying peeled sesame seeds, giving it a similar chemical composition and nutritional properties. Tahini can be served alone as a sauce, or used as a main ingredient in dishes like hummus and halva. It is widely used in the Levant, eastern Mediterranean, southern Caucasus, and parts of northern Africa (WHO, 2008).

1.2. Halal

The concept of halal can be interpreted in various ways, including linguistic, religious, cultural, health-related, and other contexts. The term itself is of Arabic origin, and can be translated as "allowed" or "permissible". In the context of Islam, it refers to everything that is permitted by faith, and encompasses the entire lifestyle of Muslims. Haram is a term that denotes that which is contrary to halal, i.e. that which is forbidden. The rules related to halal food and slaughter are based on the Holy Quran, Sunnah, Hadith, and the opinions of religious scholars (Dugonjić, 2019). Individuals who follow a halal diet look for the halal mark on products, indicating that it has been certified by a halal certification body. This confirms that every ingredient in the product is halal (Dugonjić, 2019). According to a report by the State of the Global Islamic Economy, the global halal market was worth approximately \$2.4 trillion in 2020., with the halal food market accounting for the majority of its value. However, in the European Union, not all food products are halal certified, so members of the Islamic faith must determine the status of a product based on its ingredients.

This paper aims to provide an a brief nutritional overview of hummus, as well as overview of the requirements for commercial production of halal hummus based on norm HRN BAS 1049:2010.

2. Materials and methods

This study was conducted using six samples of hummus collected from retail chains in the Republic of Croatia in April 2023. The nutritional declaration (Table 1) and list of ingredients (Table 2) were analyzed. To

determine the halal status of the hummus, the halal norm HRN BAS 1049:2010 was followed. This standard, which represents the second edition of the original Halal standard BAS 1049:2007 issued by the Institute for Standardization of Bosnia and Herzegovina, was adopted by the Croatian Standards Institute in 2010. It is one of the first halal standards in the world approved by the Islamic community and officially registered in the Institute for Standardization. This means that a unique method of halal certification has been established in the countries of the region, including Croatia, Bosnia and Herzegovina, Serbia, Montenegro, and Macedonia. The requirements of the halal standard are applied to the entire production process, which is defined by the flow chart during the establishment of the Hazard Analysis and Critical Control Points (*HACCP*) system (Fig.1). To monitor and ensure the integrity of the production process, haram critical control points (*HrCCP*) and the analysis of haram critical control points (*HrACCP*) have been defined. The aim of the analysis is to

prevent contamination with haram during production of halal hummus. The requirements of the norm, including actions for the prevention and correction of non-compliance, are defined by documented procedures and records of their implementation. This ensures accountability and provides guidelines for planning and conducting audits (Ljevaković and Jašić, 2010; HRN BAS 1049:2010). The application of halal standards is contingent upon the certification of the company by a halal certification body.

3. Results and discussion

3.1. Nutritional profile of industrial hummus

Table 1 shows caloric and nutritional values for 6 different brands of hummus collected on the market of the Republic of Croatia, expressed per 100 grams of product.

Table 1. Comparison of nutritional characteristics of different commercially available hummus (*expressed per 100g of product)

Product brand	Calories (kcal)*	Fat (g)*	Saturated Fat (g)*	Carbohydrates (g)*	Sugars (g)*	Fiber (g)*	Protein (g)*	Salt (g)*	Halal certified
Ribella	231	19	2	6.7	0.7	5.4	5.5	1	No
Sana	295	24	3.5	13	0.2	NA	6	0.5	Yes
dmBio	263	23	2.8	9.2	0.6	3	3.9	1.1	No
Nutrigold	258	20	1.5	10	0.5	7.5	6.5	1.1	No
Chef Select	272	20.8	1.9	12	2.2	5.2	6.7	1.63	No
Spar veggie	293	23	2.8	11	0.9	4	8.6	1.3	No

Table 1 shows that the caloric value of hummus ranges from 231 to 295 kcal, while total fat in the mentioned products ranges from 19 to 24g, saturated fat from 1.5 to 3g, carbohydrates from 6.7 to 11g, sugar from 0.2 to 2.2g, fiber from 3 to 7.5g, protein from 3.9 to 8.6g, and salt from 0.5 to 1.63g. The proportion of individual nutrients varies depending on the ingredients used in each brand of hummus, which are listed in Table 2. Nevertheless, hummus can be considered a balanced meal as it contains all three macronutrients.

Although macronutrient data is not presented in Table 1, it is worth noting that hummus has been identified as a good source of several essential micronutrients. According to Papanikolaou and Fulgoni (2008), hummus is rich in vitamin A, vitamin E, vitamin C, folate, iron, and magnesium. The Naturally Nutrient Rich (NNR) score is a universal nutrient-to-calorie ratio calculated as the average of the percent daily value (%DV) for 16 nutrients: $NNR = \frac{\sum \%DV}{2000Kcal/16}$. Using data from the U.S. Department of Agriculture National Nutrient Database, nutritional profiles and NNR scores

were calculated for common dips and spreads, revealing that traditional hummus has the highest NNR score (98.42) compared to *Bean Dip* (82.36), *Ranch Dressing* (23.02), *Salsa* (89.29), *Sour Cream* (42.95), *Cream Cheese* (41.86), and *Peanut Butter* (67.94). Choosing traditional hummus as a dip or spread can help maximize the nutrient-to-calorie ratio due to its unique blend of health-promoting ingredients (Wallace et al., 2016).

Although research on the topic is still emerging, several studies have highlighted the potential health benefits of consuming hummus or chickpeas. Specifically, studies have found evidence linking these foods to improvements in weight control, glucose and insulin response, cardiovascular disease, cancer, and gastrointestinal health (Wallace et al., 2016).

In order to adequately comment on the halal status, we must consider each of the ingredients of hummus. First of all, it is necessary to take

into account the origin of the ingredients, but also the possibility of contamination with haram of individual ingredients or the finished product during all production steps.

Through the mentioned 6 types of commercially available hummus in Table 2, a total of 18 ingredients appear in the composition: chickpeas, rapeseed oil, SOY oil, sunflower oil, olive oil, SESAME pasta, starch (corn/modified/maltodextrin) alcohol vinger, lemon juice spices and spice extracts (salt, garlic, cumin, paprika, coriander, chili, white pepper, herbs) acidity regulator (citric acid, sodium hydrogen carbonate, sodium acetat, octenoic acid, lactic acid 3B), sugar 0.45%, preservative (potassium sorbate). All six samples of hummus that were analyzed contained two essential ingredients - chickpeas and tahini. These ingredients are used both in traditional and industrial production of hummus.

Table 2. Comparison of hummus ingredients of different commercially available hummus

Product brand	Ingredients
Ribella	Boiled chickpeas 76%, rapeseed oil, SESAME pasta, spices and spice extracts, table salt, acidity regulator (citric acid, sodium hydrogen carbonate), sugar 0.45%, preservative (potassium sorbate)
Sana	Boiled chickpeas 48%, SOY oil, SESAME pasta 16%, water, corn starch, salt, garlic, acidity regulators (citric acid, octenoic acid), preservative (potassium sorbate)
dmBio	Water, 34% chickpeas*, sunflower oil*, 3% garlic*, olive oil* (extra virgin), 2% sesame*, sea salt, cumin*, lemon juice concentrate*, cornstarch*, coriander*, paprika*; *from organic farming
Nutrigold	Cooked chickpeas* 48%, sunflower oil*, water, tahini* 2% (sesame pasta), extra virgin olive oil*, lemon juice* (concentrate), salt, garlic*, white pepper*, cumin*; *from certified organic cultivation
Chef Select	55% chickpeas, rapeseed oil, water, 12% sesame, alcohol vinegar, sugar, table salt, modified starch, starch, lemon juice concentrate, garlic, spices, chili, herbs, acidity regulator (sodium acetates), thickener (guar gum)
Spar veggie	53% chickpeas, water, sesame, rapeseed oil, olive oil, salt, lemon juice powder, acidity regulator: citric acid, lactic acid 3B, preservative: potassium sorbate, maltodextrin, natural lemon flavor, garlic, spice

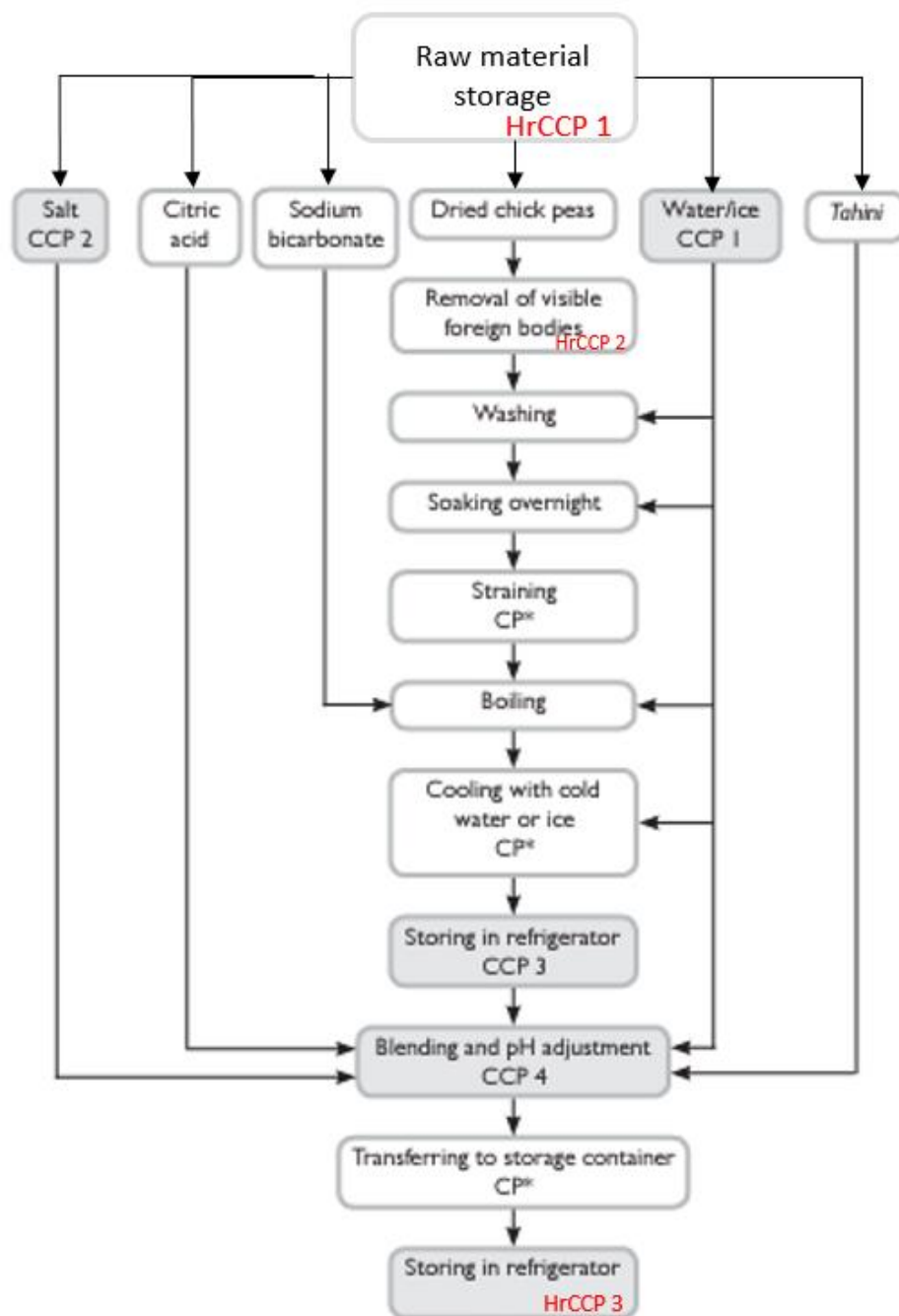
According to the halal standard HRN BAS 1049:2010, all ingredients listed in the samples can be considered halal, as they are mostly of plant or synthetic origin and do not come from prohibited animals. However, if any of the ingredients have a *GMO* origin, they are considered meshbuh or suspicious, which is interpreted by Islamic jurists as something that is tried to

be avoided as much as possible. Therefore, until proven otherwise, meshbuh ingredients are treated as haram or forbidden (Dugonjić, 2019).

It is important to ensure that during the production process, there is no contact with haram in order for the final product to be halal. This requires the producer to carry out

a haram analysis, which will be described in detail in the next chapter.

3.2. The analysis of haram



Picture 1. Illustrates the hummus production process with the *HrCCP* points clearly identified.
Note: This flow chart is presented as an example and may not represent the exact process used by all hummus producers.

To ensure that products are free from haram elements, an analysis is conducted by examining the production process flow chart to identify critical control points (referred to as *HrCCP*) where haram elements may be present. For each

HrCCP identified, a method of measurement and control is determined, and a corrective action plan is developed in case the point is not adequately monitored, and there is a possibility of the final product becoming haram. The

analysis of hygiene and health safety, along with good manufacturing practices, is a necessary prerequisite for identifying *HrCCPs*. When analyzing *HrACCP* for haram control, all processes involved in producing halal products must be considered (HRN BAS 1049:2010) (Uršulin-Trstenjak et al., 2017).

It is important to understand that the *CCPs* identified in a *HACCP* plan may differ from the *HrCCPs*. While a safe and healthy product is a prerequisite for halal certification, halal standards represent an elevated level of quality for consumers seeking halal products (Ljevaković and Jašić, 2010).

Table 3. Haram analysis according to HRN BAS 1049:2010

HrCCP	HAZARD	REQUEST OF NORM HRN BAS 1049:2010	MONITORING		CORRECTIVE ACTION
			TEST	FREQUENCY	
<i>HrCCP</i> 1 - Raw material storage	Raw material is not halal	5.9, 5.10, 5.11, 5.12, 5.14, 6	Checking of Halal certificate for each raw material, laboratory analyses on haram presence (Pork protein, alcohol, <i>GMO</i>), Visual Examination-storage in a separate, special storage area with a visible halal label	ongoing basis	in case of haram, a procedure non-conformity management is used
<i>HrCCP</i> 2 - Removal of visible foreign bodies	Physical and Biological: Foreign matter; presence of haram insects	6,7	Visual Examination	with every production	in case of haram, a procedure non-conformity management is used
<i>HrCCP</i> 3 - Storing in refrigerator	the halal product was mistakenly replaced with a halal product	5.10, 5.14	Visual Examination-storage in a separate, special storage area with a visible halal label	ongoing basis	in case of haram, a procedure non-conformity management is used

Table 3. provides an analysis of the *HrCCP* for hummus production. The analysis identifies three critical control points: *HrCCP* 1 - Raw Material Storage, *HrCCP* 2 - Removal of Visible Foreign Bodies, and *HrCCP* 3 - Storing in the Refrigerator.

To ensure the production of halal products, the entire production process requires the physical or spatial separation of halal and haram raw materials and products, as defined by the HRN BAS 1049:2010 standard. Before using any raw materials, the supplier must provide a halal certificate from a credible, accredited certification body or a statement on the halal status of the raw material with the manufacturer's specification if it is a low-risk raw material according to halal standard. If needed, a laboratory analysis is required for the presence of haram ingredients. All accepted raw materials should be stored in a dedicated storage area with a visible halal label.

During production, weighing, mixing, and combining halal raw materials should be done

separately from haram raw materials using separate machines and utensils. If there is a need to use the same utensils and industrial dishes, it is necessary to separate the production of halal and haram and thoroughly wash the equipment before switching to halal production. Verification of the cleaning process can be done through methods such as detecting chemiluminescence (a luminometer evaluates surface cleanliness by measuring the chemical marker adenosine triphosphate (*ATP*), a compound found in all types of plant, animal, and microbial cells) or using rapid tests for the detection of haram.

The removal of visible foreign bodies is essential for halal production, as certain insects are prohibited according to the HRN BAS 1049:2010 standard. Insects are living organisms that can potentially cause harm to humans if consumed in large quantities or if they carry harmful microorganisms. Their presence can also indicate poor sanitation practices or inadequate storage conditions, which can lead to

the growth of harmful bacteria and other microorganisms in the food.

Finally, halal finished products should be stored in a dedicated space marked with the halal mark or the inscription halal products. If there is a risk of cross-contamination with non-halal finished products, it is necessary to physically separate them.

If contamination is detected at any of the identified *HACCP* points, the non-conformance management procedure should be followed (HRN BAS 1049:2010; Codex Alimentarius Commission, 2/2001).

4. Conclusion

While calorie counting has been a traditional strategy for weight control, the application of the nutrient density standard helps consumers make informed decisions that maximize the nutritional value of each calorie towards meeting daily intake recommendations. As a traditional Middle Eastern dish, hummus is becoming increasingly popular in Western kitchens due to its high Naturally Nutrient Rich score (*NNR*) compared to most other spreads and sauces. Making hummus at home using a traditional recipe is recommended, as it allows consumers to ensure the quality of the ingredients used. Further research is needed to draw final conclusions about the health benefits of hummus.

According to HRN BAS 1049:2010, hummus falls into the low-risk category for haram, primarily because its ingredients are mostly of plant origin, although some additives used in commercial production may be of synthetic origin. The application of halal standards is contingent upon the certification of the company by a halal certification body. Haram analysis is conducted to identify *HrCCPs* and establish preventive measures aimed at preventing contamination of the final product with haram. By adequately supervising, hummus producers can ensure the production of high-quality and halal-compliant products.

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In this world, most people's legacies fade away with their passing, but there are a rare few whose contributions endure long after they are gone. One such individual was Dževdet Tinjić. He is responsible for bringing together the team of authors, and for the topic itself.

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Humus - tradicionalno halal jelo bliskog istoka

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Pregledni rad

PODACI O RADU SAŽETAK

Ključne riječi:

humus, halal status, halal proizvodnja, HrCCP, zdravstvene prednosti

Uvod: Humus je biljno proteinsko-lipidno jelo, sa visokim indeksom sitosti. Glavni sastojci su slanutak i susam. Konzumirao ga je praotac svih vjera, Abraham ili, među muslimanima, Ibrahim a.s.. Humus je popularan u većini arapskih zemalja i Izraelu, a sve je popularniji u zapadnim zemljama. Osnovni pojmovi koji se koriste u komentarisanoj halal statusa proizvoda su halal (dozvoljeno), haram (zabranjeno) i mešbuh (upitno).

Cilj rada: Cilj rada je dati kratak nutritivni pregled humusa, kao i pregled zahtjeva za komercijalnu proizvodnju halal humusa.

Materijali i metode: U radu je upoređen nutritivni sastav kao i spisak sastojaka ukupno 6 komercijalno dostupnih humusa. Haram analiza je izvršena na osnovu halal norme HRN BAS 1049:2010.

Rezultati i diskusija: Kalorijska vrijednost humusa kreće se od 231 do 295 kcal, dok se ukupne masti u navedenim proizvodima kreću od 19 do 24 g, zasićene masti od 1,5 do 3 g, ugljikohidrati od 6,7 do 11 g, šećeri od 0,2 do 2,2 g, vlakna od 3 do 7,5 g, proteini od 3,9 do 8,6 g i soli od 0,5 do 1,63 g. Iako je brojanje kalorija tradicionalni pristup upravljanju težinom, korištenje standarda gustine nutrijenata može pomoći pojedincima da imaju kvalitetniju ishranu. Humus ima višu ocjenu na skali hrane prirodno bogate nutrijentima (NNR) u odnosu na druge namaze i umake.

Na temelju HRN BAS 1049:2010, humus se smatra niskim rizikom za haram jer su njegovi sastojci uglavnom biljnog porijekla, iako neki aditivi koji se koriste u komercijalnoj proizvodnji mogu biti sintetički. Haram analiza se vrši radi identifikacije haram kritičnih kontrolnih tačaka (HrCCP) i uspostavljanja preventivnih mjera za izbjegavanje haram kontaminacije konačnog proizvoda.

Zaključak: Humus je nutritivno uravnoteženo jelo. Iako humus spada u kategoriju niskog rizika u pogledu halala, potrebno je provesti adekvatan nadzor nad HrCCP-a.

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Halal and Kosher Gelatin perspectives in the food production

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Gelatin, Kosher, Yoghurt,

Natural enzyme, Halal source.

The gelatin production is always remained a concern of great debate worldwide. The collagen found in animal bones, skins, and connective tissues is partially hydrolyzed to produce gelatin, a water-soluble protein. Gelatin has a wide range of uses in many different industries, including the food, pharmaceutical, and cosmetics industries. But in Halal and Kosher food industries, it is regarded as one of the most contentious components. The acceptability of items containing gelatin is determined by the animal from which it was derived, and it is impossible to determine the source animal from which the gelatin originated after it is combined with food or pharmaceutical products. As a result, there is a chance of financially motivated adulteration or mislabeling. In yoghurt production, milk is incorporated with gelatin to counter the syneresis problem during storage, but gelatin source is unknown which led to Halal or Haram ethical issues. This study focused on yoghurt production from plant enzyme extracted from plant source as gelatin replacer and to examine the rheological properties of yogurt. The effects of varied plant enzyme concentrations ranging with various setting temperatures and time treatments were evaluated. The enzymatic treatment of milk proved beneficial to retard the syneresis phenomenon during yogurt storage at 4°C which improved water holding capacity during centrifugation. The post-acidification procedure and stability of yogurt samples were both effected by plant enzyme with milk protein that proved effective tool for improving functional properties of yoghurt. As consumer concerns about the authenticity of Halal and Kosher food and non-food products have grown. Therefore, origin of gelatin must be detected and quantified in order to ensure its integrity with regard to Halal and Kosher issues.

1. Introduction

Many dietary, medicinal, and cosmetic products use gelatin made from various animal sources. Gelatin species identification has become in significance for both health and religious grounds. For instance, the most popular form of porcine gelatin has a non-halal component that

is expressly prohibited in Islam as a faith. Gelatin is a blend of polypeptides made from collagen that has been taken from animal hides, skin, and bones and partially hydrolyzed (Guo et al., 2018). Due to its low cost and gelling ability, it is frequently utilized as an ingredient in culinary, pharmaceutical, and cosmetic applications. Although there are additional

newly developing gelatin sources from fish and fowl, bovine and porcine gelatins are the main sources of commercial gelatins (Shabani et al., 2015). Due to a number of factors, including health and religious beliefs, the source of the gelatin in products has come under intense scrutiny. For instance, items containing swine derivatives are prohibited by Islam and are regarded as non-halal. Gelatin species authentication is so crucial to ensuring that the goods used by the Islamic community adhere to halal regulations. Gelatin species authentication is crucial to verify that the goods used by the Islamic community adhere to the halal laws of the countries in which they are produced (Uddin et al., 2021). With the Muslim population reaching over 1.7 billion people (more than 20% of the world's population), the demand for halal cuisine has grown concurrently. Globally, the halal market is worth roughly 2.1 trillion USD. According to Ahmad et al. (2013), the halal market is expanding at an estimated rate of 25% annually, making the production of halal food profitable both in Muslim-majority and non-Muslim nations. The halal food industry is expanding not just in Muslim nations but also in western markets with sizable and expanding Muslim populations, where halal observance is rising (Aziz and Chok, 2012). Around 12% of the total commerce in agri-food goods, or about 80 billion US dollars, is thought to be traded in halal food items globally. This percentage is bound to rise as Muslim customers' numbers and incomes are anticipated to rise. Halal goods could easily account for 20% of global trade in food products given that Muslims are expected to make up 30% of the world's population by 2025. (Karim and Bhat, 2008). Halal translates as permissible or legal in Islamic law (Riaz and Chaudry, 2004). The word "Halal" is frequently associated with food in the thoughts of most people. However, halal products can also refer to other parts of Islamic law and include cosmetics and medications (Regenstein et al., 2003). Muslims want their cuisine to be *Toyyiban* in addition to meeting the halal criteria (i.e., wholesome and of good quality). Halal nutrition also places a high value on halal meals. In Turkey, a growing interest in halal cuisine developed in the 1970s. This orientation started with religious belief people having margarine suspicions, and it persisted to assure that the daily meat demand from religious butchers. A devoted Muslim has been looking for halal meals constantly for these reasons. They avoided any questionable situations.

Islamic dietary laws permit the consumption of halal foods (Batu and Regenstein, 2014; Batu, 2015). The "halal industry," which spans numerous industries like food, textiles, transportation, finance, and tourism, has expanded swiftly. One of the key elements driving the expansion of the halal business is the need for "halal food, halal finance, halal transportation, and halal holidays" among Muslim customers. The idea of "halal tourism" has grown more popular throughout the world, including Turkey, due to expectations of Islamic lifestyle, hygiene, security, and services specifically for women. Thousands of food products use illegal gelatin around the world, and sadly, many of these haram food products are frequently tried to be sold to Muslims. This is despite the fact that there are some alternative gelling agents of botanical origin.

2. Potential solutions for Gelatin Issues in Muslim Culture

2.1. Gelatin from mammalian gelatin

Mammalian gelatins are produced using a process that includes washing, pretreatment, gelatin extraction, filtration, concentration, evaporation, sterilisation, and drying. Porcine and cattle hides are washed in water before processing. To remove minerals like calcium carbonate, bones are broken and placed in a 4-7% HCl solution for more than two days. The result is ossein, a bone substance that resembles a sponge. As previously noted, the input material can be processed with either acid or alkali before gelatin extraction. Depending on the collagen source, the quantity of covalent cross-linkages, which rises with animal age, and the desired quality of the final gelatin, the appropriate pretreatment will be used. For the less covalently cross-linked collagens present in young animals, a brief pretreatment with diluted acid (mild pretreatment) is commonly employed, whereas a more intense alkali pretreatment (severe pretreatment) is normally used for the more covalently cross-linked collagens seen in older animals. The pretreatment techniques alter the collagen molecules physically and chemically (Haug and Draget, 2009).

2.2. Fish or chicken gelatins

In addition to the ethical concerns, the 1980s mad cow disease outbreak (also known as BSE, or bovine spongiform encephalopathy) hastened

the hunt for a mammalian gelatin substitute. The characteristics of the gelatin made from the skin of a tuna fish differ from those of a tilapia or a Nile perch. Currently, fish gelatin costs significantly more than conventionally made gelatin. This is primarily due to the high cost of transportation and poor collagen content of fish skins.

Due to potential allergic issues, fish gelatin is subject to various rules addressing the requirement to mention it on a label (Schrieber and Gareis, 2007).

With features including a lower melting point that causes rapid disintegration in the mouth without a lingering "chewy" feeling, fish gelatin has been cited as a superior option to mammalian gelatins in specific situations. Fish skin, a significant waste and pollution-producing byproduct of the fish processing industry, could be a useful source of gelatin (Nagai and Suzuki, 2000). Fish skin is typically used to extract fish gelatin, which can then be pre-treated with either acid or alkali. These skins are freezer-safe. The fish skins should then be defrosted, properly cleansed by washing in cold water to remove any remaining fat or muscle, and treated with alkali or organic acids, frequently both to remove proteins and to expand the collagen, for up to 24 hours. The final optimization may serve as the basis for the order. The skins are then removed, typically using water (over 40°C). Following this, various cleanup procedures like filtering and contact with activated charcoal may be used. It can then be dried, typically using a vacuum (Schrieber and Gareis, 2007; Sebastian, 2014).

The cold-water fish gelatins are known for having good emulsifying and film-forming capabilities. As a result, the main application areas right now involve using various micro-encapsulation techniques or embedding oil-based vitamins during spray-drying. In contrast, the gelatin made from fish caught in warmer waters has excellent gelling qualities; in fact, it has a nature that is very similar to the more prevalent varieties of gelatin and is employed in the food and pharmaceutical industries (Sebastian, 2014).

If chicken is murdered according to Islamic law, chicken skin gelatin can be used as a replacement to mammalian gelatin. Gelatin is anticipated to be produced in the near future from poultry skin and bones, although

commercial manufacturing is currently constrained by poor yields. There are, however, few peer-reviewed research on the manufacture of gelatin from chicken skins and none on the production of gelatin from chicken bones. When compared to stated fish gelatin qualities, chicken gelatin has better physicochemical properties and shares a chemical makeup with bovine gelatin. Both bovine and chicken gelatin developed stable structures after chilling, with chicken gelatin having a much higher gel strength. In comparison to bovine gelatin, chicken gelatin displayed greater gelling temperatures (Sarbon et al., 2013).

2.3. Different Gelatin Alternatives

There must be new methods used to provide gelatin substitutes for the food business (Morrison et al., 1999). Many of the polysaccharides that have been offered as gelatin substitutes for the food industry do not have the well-defined melt/set characteristics of gelatin and instead gel on the basis of cation-induced connection zones. Gels based on carrageenan, alginate, or gellan are a few examples. Alternatives to gelatin made of polysaccharides typically have molecular structures that are less flexible and have greater viscosities than gelatin. In applications where "melt-in-the-mouth" qualities are critical for product quality and where moderate acidity is acceptable or required, Agoub et al. (2007) proposed that combinations of pyruvate-free xanthan and konjac glucomannan (KGM) could provide a viable substitute. A perfect illustration of what makes gelatin special as a gelling ingredient is fruit gummies. They quickly absorb water in the mouth, the gel melts as the melting point drops to body temperature, and the flavours and smells are released. Other hydrocolloids do not exhibit this characteristic to the same degree. Glycerol syrup, sucrose, gelatin, and water make up the majority of the ingredients in fruit gummies (Schrieber and Gareis, 2007; Hasenhuettl and Hartel, 2008).

3. Gelatin applications in food industry

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(Schrieber and Gareis, 2007: 163; Hasenhuettl and Hartel, 2008: 70).

3.1. Ice cream and fermented milk

Casein may lose its stabilising qualities while being processed or stored for use in yoghurt and ice cream.

Gelatin makes the milk's fat droplets hydrophilic by reducing the aqueous phase's surface tension and encircling them with an incredibly thin coating (Schrieber and Gareis, 2007). Gelatin is a substance that works well with milk proteins and enhances sensory awareness by not overpowering the flavour of the product like some other gums. The manufacturer would have the option of generating a wide range of textures in food products by using various concentrations of gelatin.

If such tensions arise, gelatin can basically stop whey from being ejected. The gelatin in ice cream also affects how big and where the ice crystals are distributed. There are other colloids that can be employed to stabilise ice cream, and this is only one of them (Sebastian, 2014). However, the use of the various chemicals has declined as a result of consumer opposition, particularly for businesses trying to cater to Muslim customers (Demirhan et al., 2012).

"Gelatin is used to clarify beverages, such as fruit and vegetable juice, by fining and clarifying the juice. The goal of fining is to create a beverage that is almost flawless in terms of flavour, colour, scent, and clarity. In order to do this, undesirable colour, haze, bitterness, excessive astringency, off flavours, disagreeable aromas, etc. must be eliminated. In addition to clarifying and precipitating turbidity-causing chemicals, gelatin is employed in the manufacture of fruit juices to lower the content of polyphenols such as tannins and anthocyanogens (Schrieber and Gareis, 2007). Gelatin stabilises and clarifies solutions by causing dissolved chemicals or suspended particles, typically tannins, to fully or partially flocculate or sediment. The tannins and gelatin interact to create a sedative combination. Gelatin should not be used in excess or insufficiently during the clarifying operations to avoid overgluing or stabilising the colloidal substances that need to be eliminated (Djagny et al., 2001).

Muslims and Jews have trouble determining whether unsuitable gelatins have been used because the source of the gelatin is not listed in the ingredient statement, much alone where it comes from.

Gelatin is exempt from the requirement to be listed in the ingredient statement since it may be categorised as a processing aid in particular applications. While many Jews and Muslims demand that food products be properly certified, some Muslims and Jews attempt to discern what is acceptable by reading labels. However, some chemicals are not shown on the label because they are referred to as "processing aids" (Al-Mazeedi et al., 2012).

3.2. Confectionary and snacks

"At first appearance, it would seem that soft caramel chews, nougat, and caramel fillings for candy bars are very different types of confections. One feature unites almost all of these, though: they all contain fat that has been emulsified in a supersaturated sugar solution. The emulsion may also incorporate air bubbles and solid ingredients like almonds or sugar crystals. Gelatin is primarily used in the confectionery business to promote emulsion and foaming capabilities, manage sucrose recrystallization, and improve chewability. In addition to its thermoreversible gelling properties, gelatin is utilised in the confectionery business for its foaming, foam-stabilizing, binding, and emulsifying properties as well as its ability to regulate crystallisation (Sebastian, 2014).

Gelatin is a thickening that can be found in yoghurt, soft gummy candies, and desserts with a concentration of 8–10% of the dry weight. Typically, 3% of marshmallows include gelatin (Igoe, 1983). The confectionery business uses gelatin's foaming and foam stability properties to create extruded, moulded, and recrystallized marshmallows, wafer and candy bar fillings, chews, and nougats. These goods come in a variety of textures, flavours, dry components, and levels of aeration. The best gelatin must be chosen in consideration of foaming behaviour, texture, and storage stability depending on the final product and the sales distribution channels involved, and must be executed in collaboration with the gelatin maker (Schrieber and Gareis, 200; Hasenhuettl and Hartel, 2008).

3.3. Desserts

The national dessert of the United States is still water dessert gels. In roughly two-thirds of all households, the 'Jell-O' (Kraft Foods, 2013) items made by the market leader alone are

consistently consumed. But even outside of America, gelatin desserts rank among the most common uses for the substance. In western nations, gelatin jellies come in a wide range of shapes, hues, and flavours and are used to make fruit cake, as well as breakfast dishes, snacks, and desserts (Schrieber and Gareis, 2007).

3.4. Meat and meat products

The meat business makes extensive use of edible gelatin in products including canned hams, meat jellies, meat loaves, sausages, and boned-cooked hams. The ultimate goal of using gelatin is to absorb the liquids that break out during cooking procedures and are used for coating. Gelatin offers the meat processing industry a wide range of intriguing opportunities to help it achieve these needs. Despite the fact that many of these products are not kosher or halal! However, gelatin and gelatin hydrolysates have various uses in the meat processing sector. The gelatin hydrocolloid's technological effects, such as its capacity to bind water and meat juice in the package while being frozen or cooked, as well as its texturizing and flavor-improving qualities, are also significant (Schrieber and Gareis, 2007; Sebastian, 2014).

3.5. Pharmaceutical products

The pharmaceutical sector is another area of interest, in addition to the food industry, where the usage of gelatin cannot be disregarded. Nearly 10% of the edible gelatin produced in developed nations is used in this industry, mostly for the production of capsules and emulsions. Despite the fact that gelatin has been shown to have little biological significance, this protein has been linked to a number of therapeutic outcomes, including enhanced serological specificity and surgical properties (Pilar et al., 1996: 1-3). Capsules are made using about 90% of the pharmaceutical gelatin manufactured. Single-dose solid medication formulations often come in gelatin capsule form. The gelatin capsule shell is appropriate for the intended use (Haug and Draget, 2009). Gelatin capsules shield their contents from the effects of light, ambient oxygen, pollution, and microbial development to a significant level. There are two different kinds of capsules: hard and soft. The shell of the capsule, the sorts of drugs they contain, and the manufacturing process employed vary amongst them (Bhatt and

Agrawal, 2007).

4. Conclusion

Since fish gelatin satisfies the majority of consumer needs, it complements the growing global demand for gelatin while lowering waste from fish processing, opening the door for research and exploration of fish gelatin as an alternative to mammalian gelatins. Consumers are becoming more and more concerned about the origin of gelatins, mostly because of religious feelings and the possibility of virus and prions contamination given that it is frequently derived from animal sources. The availability of raw materials, along with the relatively poor yield and high cost, will be limiting considerations for the existing fish gelatin production, which may prevent it from increasing much, at least in the near future.

The characteristics of the commercially available fish gelatins need to be characterised and standardised, which will need extensive research. In situations when those qualities are crucial, the application of physical, enzymatic, and organic crosslinking agents may make fish gelatin more competitive by boosting its gel strength. Although fish gelatin won't ever totally replace mammalian gelatins, it is hoped that one day it will develop into a specialty product with distinguishing qualities that make it stand out from other biopolymers and satisfy the needs of the global halal/kosher market. In-depth research is also being done to determine whether mixed gelling systems made of plant-based ingredients like pectin, agar, carrageenan, etc. may replicate the special features of gelatin.

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Perspektive halal i košer želatina u proizvodnji hrane

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Stručni rad

PODACI O RADU

SAŽETAK

Ključne riječi:

Želatin, Košer, Jogurt, Enzim transglutaminaza, Halal izvor

Proizvodnja želatine uvijek je bila predmet velike rasprave širom svijeta. Kolagen koji se nalazi u životinjskim kostima, koži i vezivnim tkivima djelomično se hidrolizira kako bi se proizveo želatin, vodotopivi protein. Želatin ima širok spektar upotrebe u mnogim različitim industrijama, uključujući prehrambenu, farmaceutsku i kozmetičku industriju. Međutim, u halal i košer prehrambenim industrijama smatra se jednom od najspornijih komponenti. Prihvatljivost proizvoda koji sadrže želatin određuje se životinjom iz koje potječe, a nemoguće je utvrditi izvor životinje iz koje je želatin potekao nakon što se pomiješa s prehrambenim ili farmaceutskim proizvodima. Kao rezultat toga, postoji mogućnost za finansijski motiviranu prevaru ili pogrešnog označavanja. U proizvodnji jogurta, mlijeko se kombinira sa želatinom kako bi se riješio problem sinereze tokom skladištenja, ali izvor želatina je nepoznat, što dovodi etičkih pitanja halala ili harama. Ova studija se fokusirala na proizvodnju jogurta iz enzima transglutaminaze dobijenog iz biljnog izvora kao zamjene za želatin i na ispitivanje reoloških svojstava jogurta. Ispitali su se učinci različitih koncentracija enzima u rasponu od 0,02%, 0,03% i 0,04% s različitim temperaturama postavljanja od 35°C, 45°C i 55°C te različitim vremenskim tretmanima od 60, 90 i 120 minuta. Enzimatski tretman mlijeka pokazao se korisnim za smanjenje pojave sinereze tokom čuvanja jogurta na 4°C, što je poboljšalo sposobnost zadržavanja vode tokom centrifugiranja. Postupak naknadnog zakiseljavanja i stabilnost uzoraka jogurta bili su pod utjecajem umrežavanja transglutaminaze s mliječnim proteinima koji su se pokazali kao učinkovit alat za poboljšanje funkcionalnih svojstava jogurta. Kako su povećane zabrinutosti potrošača u vezi s autentičnošću halal i košer hrane i proizvoda, potrebno je otkriti i kvantificirati vrstu želatina kako bi se osigurala njegova cjelovitost u pogledu halal i košer pitanja.

JOURNAL OF HALAL QUALITY AND CERTIFICATION

Increasing the Competitive Advantage of Halal Businesses – Interdependence Between Internal and External Processes

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ABSTRACT

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halal, competitive advantage, stakeholder, standardisation process

Halal standards have been developed in order to offer goods to Muslims, which do not contain any forbidden substances. At the beginning, this monitoring was limited to the internal production process. But, it was realised that this was not enough and that certification should be expanded, in order to include the input and output processes related to the final product. For a successful implementation of halal standards, it is necessary to communicate these standards to all stakeholders. This paper argues that the implementation of “halal standards” in primary and support activities cannot be achieved without a good and just relationship with all people and other creations included in the implementation of a business. A long-term relationship with stakeholders will help to develop internal processes by efficiently implementing a process-oriented, quality management system based on continuous innovation. On the other hand, short-term success can be achieved with a great product, but when the rights of employees, suppliers, financiers etc. are ignored, profits will diminish very fast. Ignoring the interests of others will inevitably lead to the destruction of infrastructure, manufacturing of long-term harmful products and other actions that will harm people, animals or the environment.

1. Introduction

The market for “halal products” has been continuously growing, not only due to demand from Muslims, but also from non-Muslims. “Halal” means permissible according to Islamic law (Shari’ah), whereas the opposite is “haram” (prohibited). It is almost a well-known fact that Muslims neither consume alcohol nor pork. But the concept of “halal” and “haram” is much more, because it is based on the firm belief that Allah, the Lord of all worlds, the All-Knowing, the Creator of the visible and the invisible, is the best knower of His creatures, and therefore knows what is best for them. Just as the manufacturer of a device knows at best the pros and cons of his device, the Creator knows what

is good and what is bad for His creatures. Humans cannot know everything, and therefore have to use everything created according to the guidance of Allah: “Do you not see that Allah has made subject to you whatever is in the heavens and whatever is in the earth and amply bestowed upon you His favours, [both] apparent and unapparent? But of the people is he who disputes about Allah without knowledge or guidance or an enlightening Book [from Him].“ (Luqman 31:20)

Sometimes people think that Muslims talk too much about prohibitions. However, the reason for this is simply because the general rule in Islamic law in the relation between creations is: “Everything is permitted, except what is forbidden”. (El-Qaradawi, 1997) Here, the

principle of permission is emphasised, because the number of prohibited things is much smaller compared to the permissible ones. From this perspective, halal standards have been developed in order to offer goods, which do not contain any forbidden substances, so they can be used by Muslims. At the beginning, this monitoring was limited to the internal production process. But, it was realised that this was not enough and that certification should be expanded, in order to include the input and output processes related to the final product. In this way, halal standards cover the production process of food and beverages, but also clothes, medicine and cosmetics.

In this paper, we want to analyse the impact of halal regulations on the competitive advantage from the aspect of Porter's value chain. Porter's value chain looks at the company as a system consisting of primary and support activities. Primary activities contain: inbound logistics, operations, outbound logistics, sales and marketing, and service; whereas support activities contain: firm infrastructure, human resources, technology and procurement. Depending on the way how value chain activities are carried out, revenues and costs are affected. In order to achieve and sustain a competitive advantage, a company must understand every component of this value chain. From this perspective, halal standards currently cover all primary activities. But what about support activities? Are they halal? Will the implementation of halal standards increase competitiveness? In which way?

In order to answer these questions, we will start analysing internal processes in a company by Porter's value chain as a map. We will examine these hypotheses by analysing what the Shari'ah says about the organisation of resources in a company, i.e. analysing halal standardisation not only from the production process, but including all necessary resources, and what principles in the management of a company can be derived from these rules. In order to achieve this goal, we have also to analyse the relationship of a company to its stakeholders and all other persons and creations. In other words, our analysis will include what is called in modern management the "stakeholder approach". The stakeholder approach sees a company as a socio-economic system, where different groups (stakeholders) with different interests work together. (Wöhe, 2000) Every group makes a certain contribution to the company and asks for adequate compensation. The major task of the

company's management is to balance between the interests of these different stakeholders. If the interests of a group are ignored, this will inevitably decrease competitiveness of the company and lead to its end. Therefore, we will additionally analyse the effect of stakeholder management from an Islamic perspective on competitiveness.

2. Increasing internal competitiveness from an Islamic perspective

The first step in starting a business is to think about a product. From an Islamic perspective, products, which are explicitly forbidden in the sources of the Shari'ah (the Qur'an and the Sunnah) are prohibited. These products are according to El-Qaradawi (1997):

- intoxicants (alcohol, drugs etc.),
- forbidden meat (pork; dead, non-slaughtered animals; blood; animals dedicated to other than Allah),
- gold and silk products for men,
- gold and silver dishes,
- statues,
- interest-based transactions,
- pornography,
- prostitution and
- gambling

It is not only forbidden to trade such products, but also to produce them or get in touch in any other way (Rahman, 2014). The same rule applies to raw materials, packaging or any other possibility to contaminate the final product. In order to avoid such problems, it is necessary to have a process-oriented approach in dealing with the production of halal products. It is indispensable to have a continuous quality control for the whole process from raw materials to the finished product. This implies four things, which are promoted in modern management:

1. Process-oriented thinking
2. Implementation of a quality management system
3. Innovation
4. Holistic approach

It is insufficient to implement halal only within an organisation or factory. It is necessary to communicate halal standards with suppliers and distributors. This is especially necessary in the production of food, beverages, medicine, cosmetics, clothing and shoes. The best way to understand this principle is to analyse the process of meat production according to halal

standards. Many Muslims understand under halal meat the ritual slaughtering, which is defined in detail in the Shari'ah. However, according to Shari'ah rules, it is necessary to investigate whether the animal was fed with fodder containing forbidden substances. If it was fed with forbidden fodder, a quarantine has to be observed. (BAS, 2010) In an industrial scale meat production, it is also necessary to check whether all tools and machines are free from forbidden substances, and whether during transport or sale, there could be possible contamination.

There are also other Shari'ah rules, which have to be observed at the acquisition of goods and materials. For example, it is prohibited to buy materials from dubious sources (e.g. smuggling, theft), because buying such material makes someone complicit in such transactions. Of course, this is quite clear, but it is an indicator that a company should be careful at selecting its suppliers.

This is a classic example for the implementation of modern quality management. This process-oriented approach is also the core of modern "kaizen" philosophy, which tries to implement standards for continuous improvement. We can see the parallel with the Qur'anic imperative of "competition in doing good", stated in the ayat: "... If Allah willed, He would have made you one nation, but that (He) may test you in what He has given you; so strive as in a race in good deeds. ..." (Al-Ma'ida 5:48). This competition is not a classic competition between companies, but a competition between the believers to provide the best possible products to its customers, by using all given resources in the best possible manner. In fact, this represents an act of worship.

This is a very important fact for any halal business. It is not sufficient to rely on customers, which will only buy a product due to the halal label (i.e. due to ideological reasons). We have to keep in mind that customers have certain expectations about a product. If these expectations are not met, it can be observed that consumers will switch to a product, which is close to halal standards giving themselves a certain justification.

In order to offer the best products, innovation is at the core. Creative ways have to be developed to fulfil Shari'ah standards and use resources in a rational way, on the one hand, and meet the needs of the customers, on the other hand. But to achieve all these goals, it is necessary to acquire knowledge. The first ayat in the Qur'an revealed

to the Prophet (pbuh) was "Read! In the Name of your Lord, Who has created (all that exists)" (Al-Alaq 96:1); a clear commandment to continuously acquire knowledge, apply it and further develop existing solutions. It is necessary to understand all Shari'ah rules and to develop halal products further. An example of this is the production of medicine. If there is a forbidden element in a drug, alternatives have to be developed. Another example is halal hospitality industry. In this case, different halal products are combined for a final service. It is quite clear to offer halal food and the absence of forbidden products in a hotel or restaurant (e.g. alcohol). But, in order to have full halal products, it is necessary to understand the lifestyle of a Muslim. Besides food, people also must have the possibility to fulfil their religious obligations, especially their five daily prayers. Therefore, a prayer room (masjid) is needed and a place to carry out the ritual washing before prayer (wudu). A company has to be fully aware that there will always be new challenges, so it is necessary to be prepared for such situations. This is in line with the words of Allah: "Whoever is within the heavens and earth asks Him; every day He is bringing about a matter." (Ar-Rahman 55:29)

Halal certification focuses around the customer. The customer should receive a product according to his/her expectations. From the customer's perspective, no forbidden element should be included in a halal product, and in this case his/her need is fulfilled. But, what about the entrepreneurial perspective? Is it enough to avoid offering forbidden products or to exclude prohibited ingredients in permissible products, so the business is halal (permissible)? This leads us to the next question: a holistic perspective. The process-oriented approach, in fact, represents a holistic approach to management of a company. We have not only to think about the individual welfare of a company (a "micro-perspective"), but inevitably have to think in broader terms, by including all necessary stakeholders and all necessary resources. This comes from the fact that the whole world is given by Allah as a trust to mankind, as mentioned in the following ayat: "It is He who made the earth tame for you - so walk among its slopes and eat of His provision - and to Him is the resurrection." (Al-Mulk 67:15) However, creation was not handed over to man unconditionally, but was entrusted to him as a trust to test how he will deal with all of creation. It is forbidden to violate or damage the rights of

creation towards man without reason. This fact obligates men and women to use all given resources with respect and in a sustainable way. If man subjugates creation, then he should do as little harm and use the best and most innocuous methods. We must always keep in mind the long-term effects of our deeds, for which we will be held responsible on the day of judgement. The lack of this “long-term responsibility” leads to all problems in this world, as said by Allah says in the Qur'an: “Corruption has appeared throughout the land and sea by [reason of] what the hands of people have earned so He may let them taste part of [the consequence of] what they have done that perhaps they will return [to righteousness].” (Ar-Rum 30:41)

A good example for sustainable behaviour is the rule to avoid using too much water for ablution. The Messenger of Allah passed by Sa'd when he was performing ablution, and he said: 'What is this extravagance?' He said: 'Can there be any extravagance in ablution?' He said: 'Yes, even if you are on the bank of a flowing river.'" (Sunan Ibn Majah 425)

Thus, we have to think about the beginning and end of a product - what resources do we use and where do they end? What external effects do we cause? It is a kind of “Life cycle assessment”, which does not only assess environmental impacts, but also impacts on all creatures.

3. The relationship between stakeholders form an Islamic perspective

In our holistic analysis, we should not forget other stakeholders, except customers, who contribute in a certain way to the success of a company. They all have a certain claim towards a company. These stakeholders can be grouped in the following way, considering their claims towards a company and their contribution.

Table 1: Input and Output of Stakeholders to a Company; Source: Interpretation by authors

Stakeholder	Input	Output
Investors	Money	Halal profit, protection of capital and interests, investment in halal assets
Financiers	Money	Halal profit, repayment of debts
Employees	Work	Fair remuneration, working conditions, respect
Management	Work	Salary, respect, autonomy
Customers	Procurement of products	High quality halal products
Suppliers	Goods and services	Reliable payments, long-term relationships
Public	Infrastructure, law and order, environmental assets	Tax payments, complying with laws, environmental protection

The interaction between stakeholders is defined by formal contracts or social contracts (i.e. laws). It is necessary to consider the interests of all stakeholders in order to develop a long-term and fair relationship. Therefore, a dialogue between stakeholders is indispensable in order to receive continuous feedback that will enable a company to pursue its purpose more profitably, with more support and less tensions. Tensions will occur when contracting parties manipulate with the other side. Such manipulations are based on two things, which are mentioned in the Shari'ah:

- abuse of superior bargaining power,
- asymmetric information,

The abuse of superior bargaining positions occurs when a contracting party imposes unreasonable disadvantage on the partner by exploiting his/her position. This is the case when a contracting partner is in dire need of a certain resource. We may think about this situation, when a poor person asks for a loan from a rich one. But this can also happen, when a multinational company asks for a loan, because

it has to pay a certain surplus (interest) to receive the money. The difference between these situations is the amount of interest, but not the fact that interest has to be paid. In the same way, a company trying to build a shopping centre can be exploited, because it must pay an enormous amount of money for a small plot of land.

Exploitation of a bargaining position especially occurs at financing contracts. One of the major resources needed for an enterprise, no matter whether it is for-profit or non-profit purposes is money. In order to better understand this question, we will use the following definition for finance given by Professor Monzer Kahf: “[Finance] is the provision of factors of production, goods and services without requiring an immediate counterpart to be paid by the recipient. (Kahf, 1999)

This definition shows us that financiers of a company are not only partners, shareholders, financial intermediaries (banks etc.), but also suppliers and employees, because these stakeholders also do not ask for an immediate counterpart when they provide their services and goods. So, the complex question of corporate finance shows us that many different stakeholders contribute financially to a company. But, this position can be exploited. The Sunnah shows us how interest (or exploitation) can occur in simple exchange transactions. For example, when we look at the following hadith:

“The Messenger of Allah said: 'Dates for dates, wheat for wheat, barley for barley, salt for salt, exchanged hand to hand. Whoever gives more or takes more has engaged in interest unless they are of different types.’” (Sunan an-Nasa'i 4559)

Here six kinds of commodities are mentioned. A number of Islamic jurists classify these goods into two types: money and food. The Shari'ah prohibits the unequal exchange of the same type of goods, no matter whether it is a spot or a delayed transaction. A person, willing to receive a certain amount of money now, in order to repay a higher amount, is extorted in a certain way, because this is not a logical transaction. Famous Islamic scholar Ibn al-Qayyim explains this rule in the following way: “The secret which is behind the prohibition of unequal exchange of the same kind of precious metals is the preservation of their basic purpose, i.e. liquidity; and the reason for the prohibition of unequal exchange of the same kind of food is the preservation of their basic purpose, i.e. using as food.” (Islahi, 1996)

The Shari'ah stipulates detailed rules for goods

with monopoly power that can be used in order to develop just contracts between contracting parties. Therefore, if someone wants to invest money, he/she has to share the risk with the contracting partner or give him/her an interest-free loan. Another possibility is the exchange of a physical asset for money with a delay. In such a case a physical asset, which has no monopoly status is exchanged and therefore an individual cannot monopolise a good. The prohibition of the hoarding of food has not to be explained further, we think it is enough to quote the following hadith: The Messenger of Allah said: “Whoever hoards food (and keeps it from) the Muslims, Allah will afflict him with leprosy and bankruptcy.” (Sunan Ibn Majah 2155)

The hoarding or monopolisation of these or other goods would not happen, if these goods (precious metals, foodstuff etc.) would not have special characteristics, which cause a high demand for them. Money is used for exchange, foodstuffs are meant for nutrition. Money and foodstuffs are needed by every economic agent. Hoarding of both will lead to an exploitation of demanders. The same applies to all other contracts. Sometimes a company is a customer, sometimes a supplier - but no matter with whom a company has to deal, fair conditions have to be observed. This is clearly stated in the following ayat: “O you who have believed, do not consume one another's wealth unjustly but only [in lawful] business by mutual consent. And do not kill yourselves [or one another]. Indeed, Allah is to you ever Merciful.” (An-Nisa 4:29) Allah the Most High forbids His servants, the believers, to take property from one another in an illegal way. Therefore, e.g. gambling, interest, bribery, alcohol, monopolies are prohibited because they cause damage to the other party. In order to mutually benefit, it is necessary to share risks and avoid any kind of exploitation.

Another problem is the so-called asymmetric information. Under asymmetric information, we understand that one contracting party possesses much more information about the object of contract. Therefore, the better-informed party can misuse his position. Such situations are mentioned in many hadiths. For example: “Both the buyer and the seller give the option of either confirming or cancelling the bargain three times, and if they speak the truth and mention the defects, then their bargain will be blessed, and if they tell lies and conceal the defects, they might gain some financial gain but they will deprive their sale of (Allah's) blessings.” (Sahih al-

Bukhari 2114) It is quite clear that in any contract the partners have to openly talk about the disadvantages of a product or the possibilities to fulfil contracts. Hiding any information (e.g. defects, financial problems) will inevitably lead to problems in the execution of a contract and prevent a successful cooperation. The hiding of information before concluding contracts is called “adverse selection” in modern economics. Another example for this situation is shown in the following hadith: Ibn ‘Abbas said, "The Prophet (ﷺ) forbade the meeting of caravans (on the way) and ordained that no townsman is permitted to sell things on behalf of a bedouin." (Sahih al-Bukhari 2274) In the first case, the meeting of caravans on the way to the market is forbidden, because the seller is not informed about the prices in the city. So, a well-informed buyer could misuse his/her information. A similar situation occurs when a townsman offers to sell things on behalf of a bedouin in order to achieve higher prices than the current ones. This offer leads to fall in supply and it is not sure whether the bedouin will not be cheated by the townsman. This is a situation called “moral hazard” in modern economics, where a contracting partner misuses information after concluding a contract in order to enrich himself. This would be the case, when a partner does not publish correct information about the real profits of the company. This situation is also mentioned in the following hadith-qudsi: The Messenger of Allah (ﷺ) having said: Allah, Most High, says: "I make a third with two partners as long as one of them does not cheat the other, but when he cheats him, I depart from them." (Sunan Abu Dawud 3383)

No long-term success of an enterprise can be guaranteed when business partners are cheated. Partners have openly to talk about problems and jointly solve them. Business partners are not enemies, but share the success of each other. The same applies to one of the major financiers and most important assets of any organisation: the employees. Rights of employees are often ignored, but without highly motivated employees, no success can be generated. The first step is, of course, selecting employees. In the Qur’an, we can find several examples of how to select employees. For example, when the daughter of Shuayb (pbuh) said to her father about Musa (pbuh): “One of the women said, "O my father, hire him. Indeed, the best one you can hire is the strong and the trustworthy."” (Al-Qasas 28:26) Here are two important selection

criteria: “strength” and “trustworthiness”. Strength does not only mean physical strength, but also generally professional knowledge to execute a certain task. This is highlighted in the following ayat: [Yusuf] said, "Appoint me over the storehouses of the land. Indeed, I will be a knowing guardian." (Yusuf 12:55)

A complete employee has also to be responsible - trust means that a person fears Allah, not people, and that he does not exchange Allah’s commandments for worldly benefit. With these two characteristics, employees are able to fulfil the most complex tasks and any organisation will be successful, as said in the following hadith: “Abu Dharr said to the Prophet (ﷺ): Messenger of Allah, will you not appoint me to a public office? He stroked my shoulder with his hand and said: Abu Dharr, thou art weak and authority is a trust. And on the Day of judgement it is a cause of humiliation and repentance except for one who fulfils its obligations and (properly) discharges the duties attendant thereon.” (Sahih Muslim 1825)

Of course, it is not only sufficient that employees are skilled and trustworthy. Companies should offer adequate working conditions. The Prophet (pbuh) said: "Yes, they (slaves or servants) are your brothers, and Allah has put them under your command. So the one under whose hand Allah has put his brother, should feed him of what he eats, and give him dresses of what he wears, and should not ask him to do a thing beyond his capacity. And if at all he asks him to do a hard task, he should help him therein." (Sahih al-Bukhari 6050) Therefore, the worker must not be overloaded with work by exceeding his abilities and possibilities, nor be exploited, forced or inflicted any kind of harm. This includes exploiting vulnerable groups (minorities, women etc.) or child labour. It is important to offer good working conditions, mentioned in the hadith above. This means that wages and salaries have to be realistic and received on time. The Prophet (pbuh) said: “Give the worker his wages before his sweat dries.” (Sunan Ibn Majah 2443)

Adequate working conditions will keep employees motivated to fulfil their tasks. But as important as working conditions is the basic reason for working for a company: that is its vision and mission. A company trying its best to offer halal products in order to facilitate the life of muslims and all other people is a major motivator, which will continuously motivate employees to give their best.

4. Conclusions

For a successful halal business, it is important to combine a good internal organisation with a good relationship with all stakeholders. Efficient processes, which avoid haram and meet customer expectations, are the basis for a successful business. Internal processes have to be organised by implementing a process-oriented thinking, a quality management system, innovation and by considering a holistic approach. It is not sufficient to implement “halal thinking” only in primary activities, but also in support activities. Implementation of “halal standards” in primary and support activities cannot be achieved without a good and just relationship with all people and other creations included in the implementation of a business. This general rule can be found in the following ayat: “Indeed, Allah orders justice and good conduct and giving to relatives and forbids immorality and bad conduct and oppression. He admonishes you that perhaps you will be reminded.” (An-Nahl 16:90)

This approach will create competitive advantage because it avoids forbidden actions in all transactions. This will be perceived positively by all stakeholders and inshAllah rewarded by Allah. From a worldly side, this will reinforce the company’s reputation and loyalty among customers and other stakeholders and increase trust towards the company.

On the other hand, short-term success can be achieved with a great product, but when the rights of employees, suppliers, financiers etc. are ignored, profits will diminish faster than we think. Ignoring the interests of others will inevitably lead to the destruction of infrastructure, manufacturing of long-term harmful products and other actions that will harm people, animals or the environment. However, it has to be always kept in mind that injustice will return to the cause, because the supplication of the oppressed is directly accepted by Allah, according to the hadith: “Three supplications are accepted, there is no doubt in them (about them being accepted): The supplication of the oppressed, the supplication of the traveller, and the supplication of his father against his son.” (Jami` at-Tirmidhi 1905)

The relationship between all stakeholders can be shown with a radar chart, where the relationship is evaluated e.g. according to an ordinal scale (based on quantitative and qualitative factors). For example, the first situation (the first heptagon) contains the internal processes of a

company and in this case all points are equally distributed. If the interests of all stakeholders are respected, internal processes will go smoothly, as the company will not face external pressures. On the other hand, if the interests of some stakeholders are more important than those of others, then this will affect internal processes (illustrated by an unequally distributed heptagon) and therefore all offered products. In the second situation, for example, interests of investors and financiers are more important than those of suppliers, employees and the public. These injustices will increase dissatisfaction and the company will lack support to achieve competitive advantage.

Of course, this is a simplistic illustration – the concrete distribution of points is dependent on different situations and market conditions. But, we can conclude that the rights of all stakeholders have to be respected in order to earn a halal income.

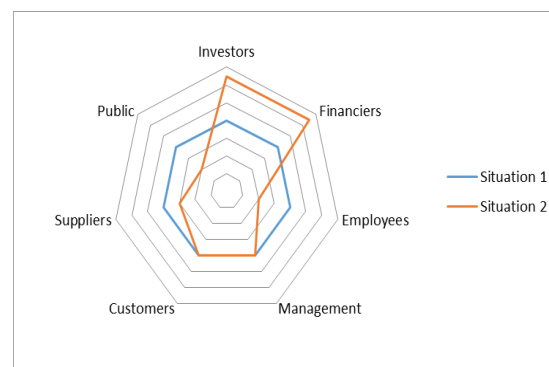


Illustration 1: The Relationship between Stakeholders According to a Radar Chart; Source: Interpretation by authors

Keeping in mind all these aspects, halal business is a more comprehensive concept than the classic certification of products. Many aspects have to be considered in this process, based on the fact that Muslims use halal and avoid haram out of conviction. This constant awareness of reward and punishment is the dominant mindset for all stakeholders to seriously follow Islamic rules.

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Povećanje konkurentske prednosti halal poslovanja – međuovisnost unutrašnjih i vanjskih procesa

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Stručni rad

PODACI O RADU

SAŽETAK

Ključne riječi:

halal, proizvodni proces, ključne osobe, halal standardi.

Halal standardi su razvijeni kako bi se muslimanima ponudila roba koja ne sadrži zabranjene supstance. U početku je ovo praćenje bilo ograničeno na interni proizvodni proces. Ali, shvatilo se da to nije dovoljno i da bi certifikaciju trebalo proširiti, kako bi uključili ulazne i izlazne procese koji se odnose na finalni proizvod. Za uspješnu implementaciju Halal standarda potrebno je ove standarde prenijeti svim zainteresiranim stranama. U ovom radu se tvrdi da se implementacija Halal standarda u primarne i prateće djelatnosti ne može postići bez dobrog i pravednog odnosa sa svim ljudima i drugim kreacijama uključenim u realizaciju poslovanja. Dugoročni odnos sa zainteresovanim stranama će pomoći u razvoju internih procesa efikasnom implementacijom sistema upravljanja kvalitetom orijentisanog na procese zasnovanog na kontinuiranim inovacijama. S druge strane, kratkoročni uspjeh se može postići odličnim proizvodom, ali kada se zanemare prava zaposlenih, dobavljača, finansijera itd., profit će se vrlo brzo smanjiti. Ignoriranje interesa drugih neminovno će dovesti do uništenja infrastrukture, proizvodnje dugotrajno štetnih proizvoda i drugih radnji koje će štetiti ljudima, životinjama ili okolišu.

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Halal Quality Management And Monitoring Practices For Better Food Accessibility

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ABSTRACT

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Muslims are devoted of the Islamic religion, and the food they consume must be Halal, Arabic for "judicial" or "suitable." Muslims are permitted to consume nutritious, halal food which has been prepared for muslims. Fizzy drinks, swine meat, blood, dead animals, and animals not butchered in accordance with Islamic law are some of the major taboos. The recent rise in deceptive Halal certificates and physical taint of Halal food products has harmed the industry's legacy. Clients of halal food began to doubt the legitimacy and halal stability of the halal food products they delivered who are living in countries that have less percentage of Muslims rather than other religions. Halal certification is currently in a confusing situation, with different Halal standards that do not agree upon one another. Muslims give much more importance on halalness in regards to their diet and nutritional choices, which has resulted in a dramatic surge in halal research. Throughout most words, the food industry is becoming more sensitive and concerned about the manufacture and origin of halal goods. The basic structure of the study on elements affecting the reliability of the Halal food supply chain, such as monitoring, market structure, quality standards, and customer satisfaction and trust. Another aim of this review is the possibilities for applying the HACCP method for halal assurance while also examining, if present halal standards share any characteristics with widely recognized food hygiene standards. To reach the highest standards, the halal distribution system can be streamlined and integrated, especially with another Halal Assurance Critical Control Point (HACCP). HACCP is systematized process for evaluating the high difficulties in a food industry, finding the key strategic points whereby a risks may worsen, and figuring out what is necessary to keep the quality of edible halal products. This review mostly consist of food safety and Halal assurance. However, halal food customers have recently been more conscious with the standard of the meals they consume. The purpose was to learn about and describe how Halal certification systems include the methodology to guidelines for food availability. By incorporating halal monitoring results and permit techniques into management collaboration protocols, endurance is increased. By assigning governance in basic distribution, substantiality can be guaranteed along the cycle of Halal food distribution. The provided halal insurance structure is a crucial idea for controlling and running the global halal food industry.

1. Introduction

The food has seen tremendous change in recent years as a result of the growing population and the more complex market demands for food's quality, welfare, and reliability, which put pressure on every stage of the food supply chain (FSC) (Ali and Suleiman, 2018; Manteghi et al., 2021). In actuality, the terms "non-Halal" and "Halal food system" relate to two distinct segments of the sustainable food supply chain (SFSC). Halal food currently makes up 20% of the global food sector, but demand for it is projected to skyrocket to more about 70% by 2050 as both the Muslim and non-Muslim markets experience rapid expansion (Hosain, 2021). There is still misunderstanding about what this in fact implies and how to preserve the authenticity of these two independent FSC systems in worldwide market, despite the fact that assurance systems have been established to guarantee the halal requirements on manufacturing traceability. This increases the need to investigate particular SFSC indicators for such two SFSCs for use in the real world. In order to regulate every potential source of contamination in supply networks, including particular information from suppliers, a halal certification system is created, which requires product traceability from businesses (Tseng et al., 2022). It was said that this approach helps a company to manufacture goods of a higher calibre and that are more responsive to clients, as well as to cut expenses associated with production and achieve supplier sustainability. (Tan et al., 2017) "Halal" is an Arabic word that denotes something that is acceptable or permitted under Islamic law (Alzeer et al., 2018). Halal food is hence food that has not been contaminated with a component that violates Islamic laws and is acceptable for Muslim people (Fuseini et al., 2021). In the same manufacturing site, numerous food producers make a wide range of food items, which could accidentally contaminate halal food items with non-halal ingredients. Manufacturers occasionally cut production costs by utilising inferior meat in their meat products, like pork, chicken, equine, rat, and dog meats in beef products. Several methods are currently being used to identify and find instances of non-halal animal species contaminating food. Because DNA is very heat resistant and may be found in both raw and cooked meat, DNA-based

approaches are the most common. A DNA-based PCR technique called high resolution melting analysis (HRMA) denatures double-stranded DNA (dsDNA) at various temperatures (Denyinghot et al., 2021). Muslims must abide by strict dietary regulations that specify which items are Halal (acceptable for consumption by Muslims) (1). Muslims are compelled to pay close attention to the food they consume since food chains are getting longer and more complicated (2). As the "halalness" of products cannot be easily verified, many Muslim customers are forced to rely on accreditation and labelling to ensure that products are produced using halal production standards. Around the world, a number of halal standardisation and certification bodies have been created (3). It is insufficient to merely meet the minimum requirements of a quality standard when applying for quality and safety certifications. The accreditation by ISO 9001 confirms that a business has implemented a quality assurance system, but it is not evidence that it is operating as intended (4). Every nation, area, and food chain have a complicated collection of contributing elements (5). Also, there are disparities in the set of determinants among SMEs and large businesses in the food retail and catering industries, food sectors, and subsectors (6, 7). (8). A successful international halal management system also requires the identification and evaluation of essential components. In order to reduce the risk of poor food quality and supply chain vulnerability, the food sector is currently guided by assurance standards such as laws and regulations. Yet, by itself, the mechanism won't be long-lasting or productive. In essence, the novelty of the idea causes the integrity aspects to be excluded from the mechanism even if everyone understands what they are. Moreover, the quality-cost concept trade-off may have an impact on the consistency parameters; some supply chain participants cut corners to decrease their profit (Roth et al., 2008). Furthermore, Study revealed that abiding to Shariah and ensuring product safety are essential two components of halalan toyyiban. (Syed Marzuki et al., 2012). Term of Toyyib implies nutritious, clean, pure, and healthful, and toyyibbah demonstrates wholesome since it is reliable for purchasers' wellbeing, as said by Yusuf Ali (Karim et al., 2020). Nowadays, food producers must abide to Shariah rules for halal foods in relation to their

preparation, manufacturing, warehousing, and distribution (Mohd Janis, 2004). Halalan toyyiban simply refers to things that are legal and acceptable under Islamic rules as long they remain secure and do not cause any damage. Halal is contrasted by haram/non-halal, which stands for forbidding and disallowed. Any food product or beverage that is categorised as "Syubhah," which is another word for "debatable" or "unreliable," that does not clearly fall into the halal or non-halal categorization is considered to be in the gray area. Muslims in this classification should withdraw from enjoying Syubhah food or beverages until the situation is more explicit (Riaz and Chaudry, 2003). Halal certification of food items extends beyond the Islamic approach to animal slaughter. Yet, it is a more comprehensive idea where food producers must follow sanitation and safety rules (Bidin, 2013). Although the related study advised integrating Shariah principles and total quality management (TQM) practices into the manufacturing procedure for halal goods. (Din and Daud, 2014). The following requirements must be met for food to be considered halal in accordance with Shariah law:

1. Does not contain any non-Halal components, haram animal products, or items made from animals that weren't killed using Islamic rituals and laws.
2. Does not include any components that are regarded as Najis (unclean)
3. secure and unharmed.
4. not made, processed, or produced with contaminated or Najis- or non-halal-compliant tools or machinery.
5. No human parts are present in the ingredients or byproducts.
6. Physical separation of halal and haram goods is required during production, preparation, packaging, storage, and distribution (Ab Talib and Mohd Johan, 2012).

If information regarding the product's origin and processing is not transparent, consumers who choose halal cuisine may have questions. In addition, halal food may be contaminated with unlawful goods during distribution to customers, and halal slaughtering requirements may not have been followed. To let customers know that food goods adhere to Sharia law and halal standards, a halal mark or certification is displayed on product packaging. Nonetheless, there is still a problem with fraudulent logos and certificates appearing on goods packaging

(Rejeb, 2018). Systems for tracking and traceability can be used to keep track of details about the product, including its halal status, supply chain participants, and manufacturing procedures. The capacity to track food, its ingredients, and the supply chain stages, which include product manufacture, processing, and distribution, is known as food traceability (Mohammadian et al., 2015). For the authenticity and trustworthiness of halal food to be ensured, the halal supply chain must be transparent. The inability to deploy halal identification and tracking systems might be hampered by a lack of understanding of halal markets, halal technology, and effective halal input usage. To ensure traceability and transparency tracking methods, particularly for halal food, we therefore require a system and technology (Rohmah et al., 2019).

Objectives

The merits and downsides of halal food management are discussed in this study's reviews. This study offers suggestions for enhancing the management and security features of the halal food business.

2. Management and strategy for halal food

The halal sector can be seen as a brand-new prospect in the modern industrial world, which is cherished by nations all over the world. To truly comprehend the halal sector, one must first understand the halal World (Peristiwa, 2019). Due to the increase of the Muslim population, which today accounts for one-third of the world's population, and the evolving needs of Muslim generations, countries all over the world started entering the halal industrial sector. This could be seen as a hint that there is a big chance to promote better economic expansion and growth on the industry for halal industrial goods. In other words, concerns regarding the methods used to produce and the origins of halal products are becoming more prevalent in the food industry (Bashir et al., 2019). The halal food industry produces the majority of and most well-known halal items (Zulfakar et al., 2014). There are still issues in the food industry, particularly as the supply of halal food is dependent on the shifting demographic of Muslims worldwide. Despite the halal market's growing popularity and potential for rapid expansion, studies on Muslim halal food consumption have mostly

been ignored (Yunus et al., 2014). Halal toyyiban, or the origin of halal food and how its consumption performed, is a notion that must be adhered to in order to comprehend and follow Islamic law. This includes food production, storage, shipping, handling, and distribution. This means that throughout any logistics operation, halal food products cannot be combined with non-halal products to ensure that an item can maintain its halal designation. Kosher food quality is important in the industry of halal food because it helps ensure that sharia and food quality standards are followed while the food is being transported from the supply point to the final consumer. Consequently, there would be no use in manufacturing halal food. Halal is usually prioritised by food manufacturers (Alhabshi., 2013). The discussion about halal products will be very in-depth if the entire manufacturing process is covered, from the starts to the consumers. In this case, the logistical activities or monitoring procedure. The supply chain for halal food is currently expanding and receiving attention on a global scale. To guarantee and verify the halal integrity of food products along the supply chain, a traceability mechanism is necessary. The traceability system is frequently used by enterprises and the food industry to check on the quality of their food products (food safety). The distinction amongst halal and non halal foods was easy to make when food technology and science were only in their infancy. It is

challenging to distinguish between both halal and haram cuisine in the current revolutionary times. It's all a result of the rapidly expanding field of food technology, where food is now made up of more ingredients than just basic materials and likely contains compounds that come from banned foods and their derivatives. Also, the manufacturing and distribution processes do not adhere to Islamic Sharia. For instance, if stuff that is forbidden has entered the process of making food. Owing to these problems, it might be difficult for the typical person to tell the difference between halal and forbidden dietary items. It necessitates both a thorough understanding of Islamic legal ideas and culinary science and technology. The business is more affordable both locally and internationally with the help of certain halal food surveillance tools and apps, both from sites, materials, and so on. This is due to recent advancements in industry, such the modern renaissance that took place during the nineteenth century, which made it simpler for manufacturers and customers to receive halal food employing elastic equipment (Ahmad and Shariff., 2016). People pass on their love of food and the abundance of nutrients it provides to the following generation (Peristiwo, 2019). Customers who purchase halal food, however, have recently grown more concerned about the legality of the cuisine, as seen in Figure 1 (Lubis et al., 2016).



Figure 1. Halal Food Supply Chain Process

The supply chain includes everyone involved in either experiencing or completing a customer request. The pre-, during-, and post-slaughter processes in the supply chain all contribute to satisfying customer demand for halal chicken meat. The raising of the animals (via breeding, infrastructure, and food sources) is part of the pre-slaughtering process, whereas the packaging, labelling, and shipping of the animals are part of the post-slaughtering process. Among other things, the feeding and reproduction practises are halal considerations during the pre-slaughtering stage. The organisations must make sure that only halal food is supplied to the animals. Care must be taken while casting food for animals in order to preserve purity and avoid cross-contamination between the two food processing methods. Pork, bile, and animal carcasses are examples of non-halal foods that are prohibited. Because it is exceedingly difficult to ensure that the sharia protocol is kept whereas the items are being transported, the fact that 3rd logistic providers (3PL) commonly provide logistic services is a big cause for concern. To reach the highest standards, the halal distribution system can be streamlined and integrated, beginning with said Halal Assurance Critical Control Point (HACCP). HACCP is a systematic process for examining the numerous risks in a food chain, pinpointing the key checkpoints where the dangers may worsen, and determining what is necessary to preserve the quality of edible halal products. It was underlined that the primary factors influencing HACCP procedures are food regulation, the industry's participation in government programmes and initiatives, training on hygiene and food safety, and contamination of food or poisoning (Pun and Bhairo-Beekho., 2008). The development of Halal into operation and a new direction in supply chain management highlights the significance of personnel accountability, knowledge, and skills for a successful HACCP implementation (Fotopoulos et al., 2011). Similar to a food safety administration system including its food safety control duties and assurance activities, a halal assurance system is necessary with its halal risk controls and iso standards for particular product-market combinations (Luning et al., 2008). Halal management and assurance operations are necessary for the development of a robust supply chain for halal foods with lower halal hazard susceptibility (Vlajic et al., 2012). People are much more curious about food standards,

purity, origin, and authenticity as a result of numerous food safety crises and occurrences (Talib et al., 2008). Customer awareness in the context of halal can be defined as a specific interest in or actual skills of a subject and what is going on right now in relation to halal foods, beverages, and products (Ambali and Bakar, 2013).

Also vast Muslim community, prior studies have shown that the Muslim population is becoming more aware of potential obstacles to their halal diet as time goes on (Hashim and Othman, 2011). All halal market patrons, especially Muslims, are becoming more selective about the foodstuff they purchase, including carefully inspecting items to ensure they don't include any dubious or prohibited non-halal ingredients. This is supported by a (Nakyinsige et al., 2012) report that asserts Muslims are more conscious of the need to uphold Islam's religious ideals through dietary practices. Due to their increased spending power, halal consumers are starting to place higher demands on products that are genuinely halal. A study by (Aziz and Chok, 2013) found that consumer knowledge of the shari'ah had a beneficial impact on consumers' intentions to purchase halal products, whether or not they are Muslims. In supply chain relationships, a company's readiness to rely on a merchant upon whom it has confidence is referred to as loyalty (Kwon and Suh, 2005). Trust is essential amongst supply chain partners, especially when sharing sensitive information like volume sales, product, and cost and process data. According to earlier study (Gundlach and Cannon, 2010), strong supply chain partnerships require mutual commitment and enduring trust.

Building trust between supply chain partners has several benefits. Trust can support future supply network and organizational initiatives by lowering transaction costs, promoting desired behavior, reducing the need for long formal contracts, hastening the resolution of disputes, and encouraging desired conduct (Sahay, 2003). The benefits of trustworthiness in supply chain partnerships, as demonstrated by (Alina et al., 2013), include more recommendations to potential business partners, more steady business dealings, fewer disagreements inside businesses, and greater business shares for both sides. While both Muslim and non-Muslim countries experience the aforementioned problems often in the halal food industry, certain of the latter's

issues are more pervasive. Consider the issues with halal regulation and law enforcement. In contrast to Muslim countries where such matters are under the control of the ruling government, halal governance is handled in non-Muslim countries by private groups (Lodhi, 2009; Shafie and Othman, 2006). As a result, various businesses providing halal certification services have been founded, primarily in Europe and the UK. Since there is no halal legislation in non-Muslim nations, any entity is qualified to offer,

affirm to supply halal authorization and monitor facilities for food companies seeking access into the halal market. The different halal requirements and costs set by the various certification bodies' halal authorization facilities frequently confused the consumable producers (Casey, 2010). That results in a growing loss of trust among halal customers and companies in these certifying agencies illustrates this reality (Figure 2).

Establishment of Safe Halal Food Management System Requisites

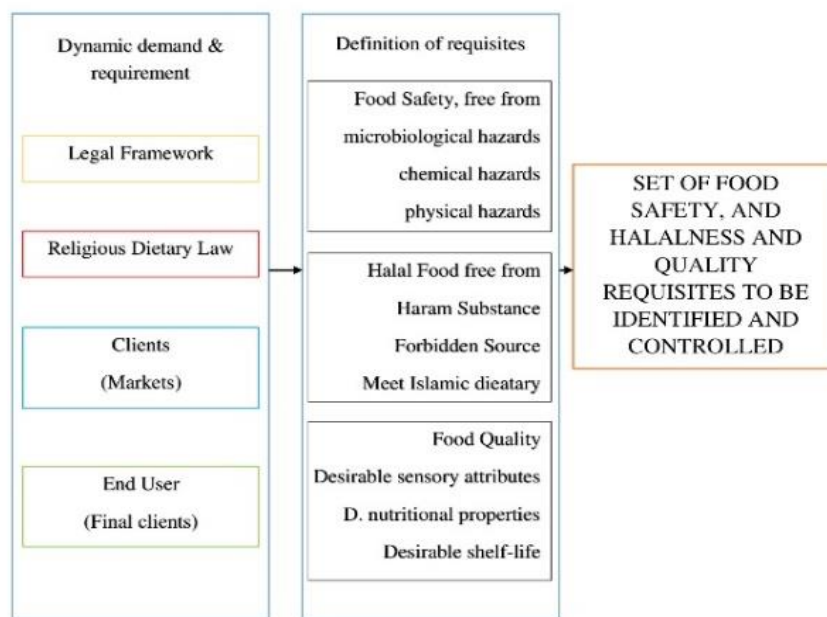


Figure 2. Establishment of Safe Halal Food Management System Requisites

There are two types of food that are blended with non-halal food. The first is the blending of non-halal substances and halal goods (Nakyinsige et al., 2012; Bashir, 2019). This comprises the use of prohibited substances, secret blood products, and the exchange of haram animal protein sources, such as using Muslim along pig in place of edible meat. This can be the outcome of an incorrect interpretation of halal rules. Then, blending also refers to mingling halal and non-halal meat in one storage container, throughout transporting, or on a shelf in a store (Basir, 2019; Jaafar et al., 2011). For instance, (Alqudsi, 2014) pointed out that in Tasmania, non-halal meat is displayed alongside the halal meat products for sale. In spite of the fact that this particular industry has been the subject of extensive inquiry and research for

more than ten years, some studies have attempted to relate the challenges in handling the halal food chain to great achievements in other industries as well as the halal food distribution network. Preventing direct contact between any non-halal components and halal food is one of the most commonly raised concerns for a full implementation of the halal food industry and supply - chain management in halal segregation. This can be done by physically separating the two; in order to preserve the quality of halal foods, they should not be in contact with each other or with other halal products or components. If halal nutrients are not processed individually during production, shipping, and storage processes, they are very sensitive and in the biggest danger of contamination. Previous studies (Lodhi, 2009;

Tieman and Ghazali, 2014) and various halal standards have repeatedly underlined the need to physically segregate halal objects in order to prevent any close communication with substances that could accidentally or purposefully damage the halal status. A technique called tracking makes it possible to follow important data regarding an item from its point of origin to the point of sale. As a result, it is possible to track and trace food, feed, equipment, and packaging throughout all stages of manufacturing. Moreover, it is possible to keep track of the techniques employed along the route, such as who used them when, once, and how (Japar Khan, 2008). It should be remembered that the products we obtain from animals, particularly meat, and the records of the animals themselves must be maintained safe for any type of inquiry required for stages related to the food chain. Meat traceability is the process of logging data on animals or meat products in a certain quantity through lots of links in the supply chain for food using a certain numbering system (Shackell, 2008). In the field of agriculture, similar descriptions of the provenance process were also offered by (Opara, 2003). It can be used to identify any non-halal components in addition to certifying and confirming that the product is really halal (Lodhi, 2009; Rashid et al., 2016). Consumer impression of the halal industry will consequently improve as a result of the improved information that customers may now access (Zakaria, 2008). Even if traceability technologies make it easy to locate the pertinent information about the topic, the reviewing and verification process cannot be ignored or abandoned. A traceability system will reinforce and add to any current inspection system (Japar Khan, 2008). The audit and confirmation process will benefit even more from an efficient traceability system, especially in terms of the process of acquiring the required certification. In this case, traceability will aid in the application process for halal certification. Halal training is essential for the growth of human capital in the halal sector. In order to have an understanding of and appreciate unique halal difficulties in the halal business and market, it is essential that we as consumers have a basic awareness of halal. For example, unapproved or dubious halal logos

logo; if we are workers, we ought to offer the action plan on how to tackle it and effectively fix it. As consumers, it is our responsibility to be informed about the most current halal trends and requirements for such food and products we buy. Nowadays, the long-term survival of the Halal industry depends on the management's ability to integrate the supply chain component with Islam or Islamic law. To better compete in the contemporary global halal market, businesses and employees working in the pharma, cosmetology, and healthcare, as well as the shipping, need specialized halal education and training (Rashid et al., 2016). Furthermore, there are differences in the scope, complexity, and duration of halal training. No halal training programs are accredited by or have their quality verified by a body. Make sure the people in charge of the butchering are competent and able to carry out their responsibilities for the Halal business, especially for the slaughterhouse. This will stop mishaps from happening while they are working and doing their jobs (Rashid et al., 2016). An emphasis on product attributes, which should reflect halal products in terms of proper cleaning, safety, health, and nutrition, is part of the complete approach to halal (Mohamad and Hassan, 2011). Hygiene, sanitary, and product safety are the cornerstones of halal food preparation, and all three have been extensively discussed in halal food research. Halal can also be used as the next benchmark for quality due to the products' high level of sanitation, hygienic production environment, and adherence to a quality of nutrition and safety. Halal logistics management has become one of the most popular areas of halal research in recent years. The length and complexity of the halal food supply chains has increased along with the size and reach of the global Muslim population. In a halal food chain, it is now very challenging to adhere to all halal requirements, and there is a big chance of cross-contamination. Modern culinary technology and global distribution have made a variety of synthetic foods and ingredients available to Muslim consumers. So, in order to give clients, trust and credibility, halal product manufacturers must set up a halal supply chain. Until now, all of these studies about the chain and supply of halal food are still very recent (Figure 3) (Bonne and Verbeke, 2008).

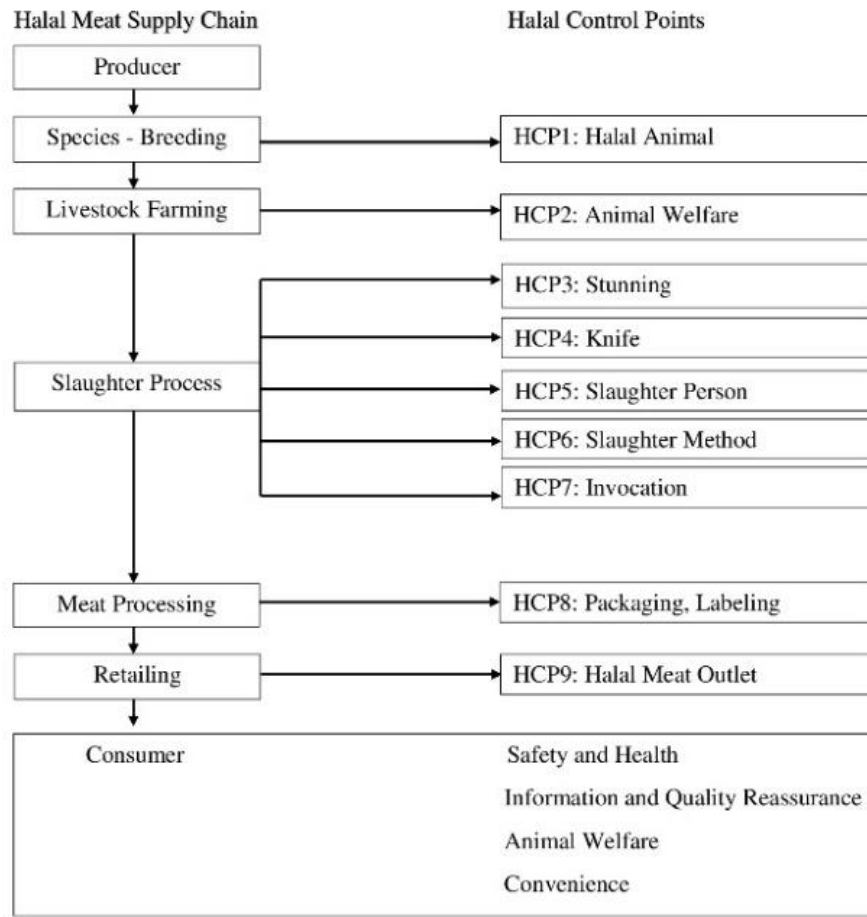


Figure 3. Diagram of Halal Food Chain

3. Conclusion

Because halal procedures lack integrity, it is plainly clear from the literature research that there are many issues and challenges in the process of creating food. The halal market is experiencing heightened competition. This is due to the fact that other countries, especially those in the China like Thailand, the East Indies, Brunei, Hong Kong, and China, have begun to seriously threaten their capacity to meet the requirements for halal food by launching a number of initiatives and utilizing their comparative advantages. Global interest in halal food goods is rising. Halal food supply networks and management research are still in their infancy. The demand for halal food is growing, nevertheless, and so is the field of study. Shari'ah, halal licensing, halal product features, public knowledge of halal, halal advertising, information technology use in halal, sharia integrity, and management of the supply chain for halal food were among the eight separate categories into which the research was broken

after a thorough analysis of existing studies on halal food. We found that the study on the supply chain for halal foods is rather limited and mostly focused on halal concept, supply chain effectiveness, and logistics. As a result, we propose several areas for additional study, such as conceptual model development, links amongst halal, lean, and green, integrity of halal packaging, empirical research, and development of halal workers' skill sets and competences. Halal food is preferred by both Muslims and non since it is guaranteed to be hygienic and healthy. In conclusion, training was one of the issues raised by prior studies. In relation to halal training classes and halal training programmes, this article aims to highlight the key issues and challenges that the Islamic sector as a whole is presently experiencing and will probably face in the near future. The implementation of the Halal Program in the Muslim Industry is highly crucial due to the significance of current consumers' understanding of Halal foods and the Halal sector. There may be the answers to the issues and challenges that had been with on. Further

research into this might learn more about the problem and lead to more exciting findings. The need for education in the Halal industry is now more critical than ever because the industry is now capable of satisfying the appetite for Halal services and products on a worldwide scale.

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Prakse upravljanja i praćenja halal kvalitete za bolju dostupnost hrane

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Pregledni rad

PODACI O RADU

SAŽETAK

Ključne riječi:

Halal kvaliteta, upravljanje halal hranom, halal certifikacija, sustav upravljanja sigurnošću hrane

Muslimani su posvećeni vjeri, a hrana koju konzumiraju mora biti halal, što na arapskom znači "dozvoljeno" ili "korisno". Muslimanima je dozvoljeno da konzumiraju nutritivno korisnu i halal hranu. Određene vrste pića, svinjsko meso, krv, strv i životinje koje nisu zaklane u skladu s islamskim propisima neke su od glavnih zabrana. Nedavni porast lažnih Halal certifikata i fizičke kontaminacije halal prehrambenih proizvoda naštetili su imidžu industrije. Potrošači halal hrane počeli su sumnjati u legitimnost i stabilnost halal proizvoda koje su uvozili iz zemalja sa procentualno manjim brojem muslimana u odnosu na druge religije. Certificiranje halal proizvoda trenutno se nalazi u zbunjujućoj situaciji, sa različitim halal standardima koji se međusobno razlikuju. Muslimani pridaju sve veću važnost halal u pogledu svoje prehrane i izbora prehrane, što je rezultiralo dramatičnim porastom istraživanja halala. Ukratko prehrambena industrija postaje sve osjetljivija i zabrinutija za proizvodnju i porijeklo halal robe. Osnovna struktura studije o elementima koji utiču na pouzdanost lanca opskrbe halal hranom, kao što su praćenje, tržišna struktura, standardi kvalitete, te zadovoljstvo i povjerenje kupaca. Još jedan cilj ovog rada su mogućnosti primjene HACCP metode za osiguranje halala, dok također ispituje, ako postoje, halal standardi dijele zajedničke karakteristike sa široko priznatim standardima higijene hrane. Kako bi se postigli najviši standardi, sistem distribucije halal proizvoda može se uskladiti i integrisati posebno s još jednom Kritičnom kontrolnom točkom Halal Assurance (HACCP). HACCP je sistematizirani proces za procjenu velikih prepreka u prehrambenoj industriji, identificiranje ključnih strateških točaka pri čemu se rizici mogu povećati i utvrđivanje što je potrebno za očuvanje kvalitete jestivih halal proizvoda. Ovaj rad se uglavnom sastoji od sigurnosti hrane i osiguranja halal. Međutim, potrošači halal hrane u posljednje vrijeme sve su svjesniji standarda za proizvodnju hrane koje konzumiraju. Svrha je bila naučiti i opisati kako sistemi halal certificiranja uključuju metodologiju i smjernice u dostupnosti halal hrane. Uključivanjem rezultata halal praćenja i odobrenih tehnika u protokole suradnje menadžmenta povećava se pouzdanost. Pomoću upravljanja u osnovnoj distribuciji može se zajamčiti održivost duž ciklusa distribucije halal hrane. Pružena struktura osiguranja halal kvaliteta je ključna ideja za kontrolu i vođenje globalne industrije halal hrane.

JOURNAL OF HALAL QUALITY AND CERTIFICATION

Benchmarking halal Ecosystems of European countries with other regions using the HDC's 10-halal Ecosystem indicators

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Review paper

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ABSTRACT

Keywords:

Halal ecosystem, halal supply chain, economic development, halal industry, halal market, halal reputation, halal integrity

In this paper, we will emphasize the importance of the "halal ecosystem" for the Islamic economy. To this end, a survey was conducted that aims to serve as a useful, effective and unbiased resource that selected European countries (countries that participated in the survey) can use to inform their long-term strategy for building a halal ecosystem and facilitating halal trade. The study also aspires to identify and map preexisting (decentralized and/or centralized) Halal Ecosystems. The study utilizes the HDC Global Halal Ecosystem Indicators created by Halal Development Corporation (HDC) as a starting point for analyzing the prospects for bolstering global halal ecosystems. We foresee the "Halal Ecosystem" becoming a defining paradigm in worldwide commerce, finance, and economic growth. This study will pave the way for the development of a Halal Ecosystem strategy applicable to the Halal sectors in the target countries.

1. Introduction

The halal market is rapidly developing. Among the growth factors are the growing Muslim population, the awareness of the Muslim consumer, as well as the fact that the basic principles of halal and Islamic values can coexist with the promotion of the United Nations Sustainable Development Goals.

The latest projections put Muslim spending in 2021 at \$2 trillion spanning the industries of food, pharmaceuticals, cosmetics, fashion, travel, media, and recreation. In 2025, it is estimated that Muslim consumption throughout the world would total USD\$2.8 trillion (Dinar Standard, 2022). The Halal sector has become a powerful and profitable market. The global market for Halal products and services is expected to grow along with the increasing Halal literacy of consumers.

Principles of Halal and Islamic values can coexist with the promotion of the United Nations' Sustainable Development Goals (UN SDGs) in the areas of social and economic development, business ethics, and environmental sustainability (Dariah et al., 2019; Dariah et al., 2016; Haqqoni et al., 2020; Idris et al., 2022; Mukhtar et al., 2018; Noor & Pickup, 2017; Shaikh & Hassan, 2018; Yesuf & Aassouli, 2020).

HDC (Halal Development Corporation Berhad) recently conducted a study with the support of important Islamic institutions such as the Standard Metrology Institute for Islamic Countries (SMIIC) and Islamic Development Bank (IsDB). The study attempted to establish the term "Halal Ecosystem" as a new essential idea in the fields of international affairs, commerce, management, finance, and trade, describing the infrastructure of interdependent

domains inside the Halal value chain. Halal Ecosystem Concept is intended to improve participation and coordination towards the ability to supply a highly-lucrative consumer demand(Erwaedy et al., 2021; Noordin et al., 2014; Shafii et al., 2018)

2. Design/methodology/approach

The questionnaire was designed to gather and provide quantitative statistical data regarding the Halal Ecosystem, with the concept being predicated on expert feedback from a process of consultation which occurred in June-July 2021. To facilitate speedy and focused resource mobilization (financial or development aid, technical assistance, or institutional capacity building), the questionnaire was also expected to address the importance of the 10 Halal indicators as a rapid evaluation tool. To determine the Key Field for Action (KEYFA) for developmental initiatives inside a country's ecosystem, the Global Halal Ecosystem Assessment study employs cutting-edge methodology with a questionnaire that was participated by 17 European countries (69 countries including other regions). Several indicators were identified as the 'performance determinants' of a country's Halal industry, and this has led to the development of the "10 Halal Ecosystem Indicators", listed as follows: 1. Integrity; 2. Governance; 3. Planning and Policies; 4. Data & Analytics; 5. Incentives; 6. Science, Technology and Innovation (STI); 7. Human Capital Development; 8. Enterprise Development; 9. Infrastructure and Logistics;

and 10. Promotion and Awareness.

This research uses radar charts to assess the state of the Halal ecosystem in each European nation. Radar charts are used to compare and contrast two or more groups by highlighting their similarities and differences across a wide range of characteristics (Model Systems Knowledge Translation Center, 2012). In most cases, the criteria or elements being compared will be relatively different from one another. In this study, for example, evaluations vary from 0 to 10, hence the scores given to each element are roughly calibrated. If a country gets a higher score, it means the country did well on that particular metric. All component and characteristic scores radiate outward from a central zero. Factor ratings from each subgroup are added together to provide a "radar image" or "spider web" of the whole (Lechner & Weidmann, 2015).

3. Result and discussion

Findings

The survey was conducted between August 2022 to October 2022 and garnered 336 responses, achieving the intended target of 300 responses. The survey generated 219 responses from the Asian region, 57 responses from the European region, 38 responses from the African region, 15 responses from the American region, and 7 responses from the Australian region. The survey showcased the 10-point Halal Ecosystem indicators as a basis for analyzing the country's readiness when it comes to developing its Halal Ecosystem.

Table 1. Halal Ecosystem Indicators - Europe

Country	INT	GOV	PP	DA	INC	STI	HCD	ED	IL	AP	AVG
Turkey	100.00%	100.00%	100.00%	66.67%	0.00%	28.57%	33.33%	40.00%	30.00%	100.00%	59.86%
Bosnia and Herzegovina	100.00%	100.00%	0.00%	0.00%	100.00%	28.57%	100.00%	40.00%	10.00%	100.00%	57.86%
Russia	100.00%	100.00%	0.00%	100.00%	0.00%	28.57%	66.67%	40.00%	30.00%	100.00%	56.52%
Ireland	100.00%	100.00%	25.00%	66.67%	0.00%	0.00%	100.00%	60.00%	20.00%	33.33%	50.50%
Poland	33.33%	100.00%	0.00%	0.00%	0.00%	14.29%	100.00%	0.00%	40.00%	100.00%	38.76%
Switzerland	66.67%	100.00%	0.00%	0.00%	0.00%	14.29%	66.67%	20.00%	40.00%	0.00%	30.76%
United Kingdom	33.33%	0.00%	25.00%	0.00%	0.00%	28.57%	100.00%	20.00%	10.00%	66.67%	28.36%
Netherlands	66.67%	0.00%	0.00%	33.33%	0.00%	14.29%	66.67%	0.00%	30.00%	66.67%	27.76%
Belarus	100.00%	0.00%	25.00%	0.00%	0.00%	0.00%	66.67%	0.00%	10.00%	66.67%	26.83%
Spain	66.67%	100.00%	0.00%	33.33%	0.00%	0.00%	33.33%	0.00%	20.00%	0.00%	25.33%
France	66.67%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	10.00%	66.67%	24.33%
Sweden	33.33%	100.00%	0.00%	0.00%	0.00%	0.00%	33.33%	0.00%	20.00%	0.00%	18.67%
Bulgaria	66.67%	0.00%	0.00%	33.33%	0.00%	28.57%	0.00%	0.00%	0.00%	0.00%	12.86%
Italy	33.33%	0.00%	0.00%	0.00%	0.00%	0.00%	33.33%	0.00%	0.00%	33.33%	10.00%
Germany	66.67%	0.00%	0.00%	0.00%	0.00%	14.29%	0.00%	0.00%	0.00%	0.00%	8.10%
Portugal	66.67%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	10.00%	0.00%	7.67%

Belgium	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	66.67%	6.67%
Average (Europe)	64.71%	52.94%	10.29%	19.61%	5.88%	11.76%	47.06%	12.94%	16.47%	47.06%	28.87%

Source: author's calculation

This report particularly showcases the Halal Ecosystem development of the European countries. The ten indicators analyzed were: 1. Integrity (INT); 2. Governance (GOV); 3. Planning and Policies (PP); 4. Data & Analytics (DA); 5. Incentives (INC); 6. Science, Technology and Innovation (STI); 7. Human Capital Development (HCD); 8. Enterprise Development (ED); 9. Infrastructure and Logistics (IL); and 10. Awareness & Promotion

(AP). Table 1 shows that the countries with the strongest Halal Ecosystem indicators are Turkey, Bosnia, and Russia with indicator average scores of 59.86%, 57.86%, and 56.52%. Overall, Turkey has strong indicators except for Incentives and STI while Bosnia shows room for improvement in Policy & Planning, Data & Analytics, and Infrastructure & Logistics (see Table 1).

Table 2. Halal Ecosystem Indicators - Top 15

No.	Country	INT	GOV	PP	DA	INC	STI
1	Malaysia	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
2	Indonesia	66.67%	100.00%	100.00%	66.67%	100.00%	100.00%
3	Brunei	100.00%	100.00%	100.00%	100.00%	0.00%	100.00%
4	Thailand	100.00%	100.00%	100.00%	33.33%	100.00%	71.43%
5	Pakistan	100.00%	100.00%	25.00%	33.33%	100.00%	85.71%
6	Australia	66.67%	100.00%	50.00%	100.00%	0.00%	71.43%
7	UAE	100.00%	100.00%	25.00%	33.33%	0.00%	14.29%
8	Turkey	100.00%	100.00%	100.00%	66.67%	0.00%	28.57%
9	Saudi Arabia	66.67%	100.00%	100.00%	100.00%	0.00%	0.00%
10	Bosnia and Herzegovina	100.00%	100.00%	0.00%	0.00%	100.00%	28.57%
11	Republic of Korea	66.67%	100.00%	25.00%	0.00%	100.00%	71.43%
12	Russia	100.00%	100.00%	0.00%	100.00%	0.00%	28.57%
13	Uzbekistan	100.00%	100.00%	100.00%	100.00%	0.00%	0.00%
14	China	66.67%	100.00%	75.00%	33.33%	100.00%	14.29%
15	Singapore	66.67%	100.00%	75.00%	66.67%	0.00%	57.14%

Source: author's calculation

Table 2. Continued

No.	Country	HCD	ED	IL	AP	AVG
1	Malaysia	100.00%	100.00%	70.00%	100.00%	97.00%
2	Indonesia	66.67%	100.00%	70.00%	100.00%	87.00%
3	Brunei	100.00%	100.00%	40.00%	100.00%	84.00%
4	Thailand	100.00%	60.00%	70.00%	100.00%	83.48%
5	Pakistan	66.67%	20.00%	50.00%	100.00%	68.07%
6	Australia	100.00%	0.00%	60.00%	100.00%	64.81%
7	UAE	100.00%	80.00%	90.00%	100.00%	64.26%
8	Turkey	33.33%	40.00%	30.00%	100.00%	59.86%
9	Saudi Arabia	66.67%	80.00%	10.00%	66.67%	59.00%
10	Bosnia and Herzegovina	100.00%	40.00%	10.00%	100.00%	57.86%
11	Republic of Korea	66.67%	0.00%	40.00%	100.00%	56.98%
12	Russia	66.67%	40.00%	30.00%	100.00%	56.52%
13	Uzbekistan	33.33%	20.00%	40.00%	66.67%	56.00%
14	China	100.00%	20.00%	10.00%	0.00%	51.93%
15	Singapore	66.67%	0.00%	10.00%	66.67%	50.88%

Source: author's calculation

Countries like Malaysia, Indonesia, and the United Arab Emirates have invested heavily in

expanding their Halal ecosystem, propelling them to the top of the global Halal business and creating massive domestic markets. Governments have been successful in creating a robust and comprehensive ecosystem that includes policy and legislation, human capital, science, technology, innovation, awareness promotion, incentives, infrastructure and logistics, data and analytics, as well as integrity and governance, all of which contribute to a favorable setting for industry growth, which in turn boosts employment, trade, and investment. Amongst all the countries that participated in the questionnaire, the Halal Ecosystems of Turkey

and Bosnia are in the top ten (number 8 and 10 respectively), while Russia's is in the top 15 (number 12). Despite being non-Muslim majority countries, both Thailand and Australia have stronger Halal Ecosystem indicators on average compared to both Turkey and Bosnia which are Muslim-majority countries. This is due to their longstanding experience in developing their Halal industry. The success stories of non-Muslim majority countries like Thailand, Australia, South Korea, China, and Singapore should be the benchmark for European countries in terms of developing their Halal Ecosystems in the future.

Table 3. Halal Ecosystem Indicators: Europe vs Other Countries

Region	INT	GOV	PP	DA	INC	STI	HCD	ED	IL	AP	AVG
Europe	64.71%	52.94%	10.29%	19.61%	5.88%	11.76%	47.06%	12.94%	16.47%	47.06%	28.87%
America	49.51%	13.24%	2.57%	4.90%	1.47%	6.51%	11.76%	3.24%	6.62%	28.43%	12.83%
Asia	67.95%	80.77%	40.38%	41.03%	26.92%	28.02%	44.87%	35.38%	30.77%	71.80%	46.79%
Australia	83.34%	50.00%	25.00%	50.00%	0.00%	35.72%	66.67%	0.00%	35.00%	66.67%	41.24%
Africa	43.86%	31.58%	10.53%	17.54%	0.00%	11.28%	14.04%	10.53%	11.58%	36.84%	18.78%
All Countries	59.90%	56.52%	22.46%	27.54%	11.59%	18.43%	36.23%	19.71%	21.01%	52.17%	32.56%
Others (Excluding Europe)	58.82%	56.86%	26.96%	30.07%	13.73%	21.01%	32.68%	22.35%	22.35%	54.25%	33.91%

Source: author's calculation

On average, the highest indicator average score belongs to the Asian region with 46.79%, followed by the Australian region with 41.24%. The European region has an indicator average score of 28.87%, making it the third-best region above America and Africa. Having said that, there is so much room for improvement regarding the Halal Ecosystem development in

the European region, especially regarding Policy & Planning, Data & Analytics, Incentives, STI, Enterprise Development, and Infrastructure & Logistics. Most European countries have been doing quite well in the aspects of Integrity and Governance due to some level of government support. As most countries have access to certain funds, they also seem to be doing quite well in Awareness & Promotion (see Figure 1).

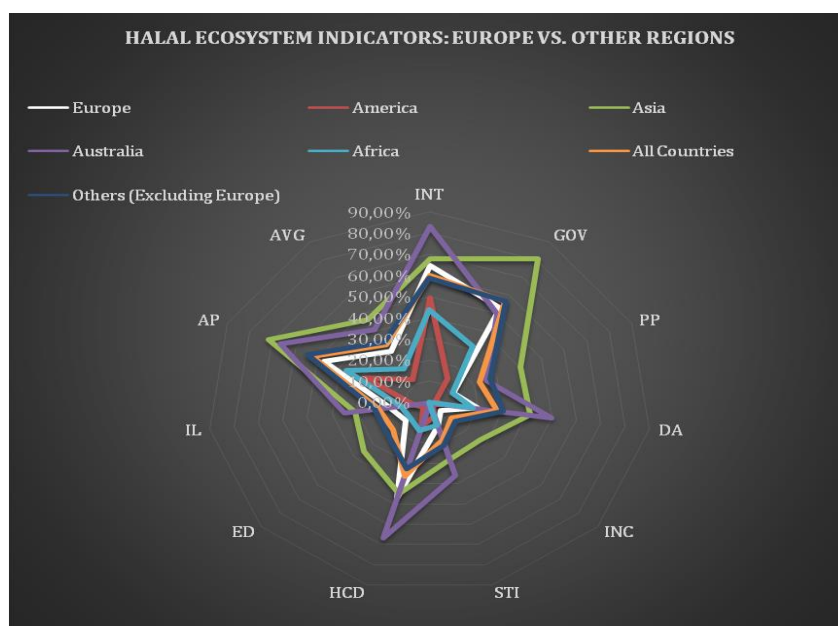


Figure 1. Radar Charts for Halal Ecosystem Indicators: Europe vs. Other Regions

Table 4 Halal Ecosystem Indicators: Europe vs Other Countries

Region	INT	GOV	PP	DA	INC	STI	HCD	ED	IL	AP	AVG
Europe	64.71%	52.94%	10.29%	19.61%	5.88%	11.76%	47.06%	12.94%	16.47%	47.06%	28.87%
Other Countries (Excluding Europe)	58.82%	56.86%	26.96%	30.07%	13.73%	21.01%	32.68%	22.35%	22.35%	54.25%	33.91%
Difference	5.88%	-3.92%	-16.67%	-10.46%	-7.84%	-9.24%	14.38%	-9.41%	-5.88%	-7.19%	-5.04%

Source: author's calculation

As can be seen in the Table above, the European countries are stronger in Integrity and Human Capital Development, but less superior in everything else. The full paper will examine the Halal Ecosystem Indicators of the European countries individually, as well as the Halal Ecosystem Indicators of the European countries as a unit compared to other regions such as Asia, Africa, Australia, and America.

Research limitations/implications

As a baseline for understanding Halal ecosystems, the article examines 17 European nations (along with 52 from other regions). To make the Global Halal Ecosystem Assessment useful in practice, future research should expand to encompass additional European countries, and more parties should be engaged in assessing and improving the data. Data should be updated once a year or twice a year.

4. Practical implications

In addition, this paper is meant to be a useful, applicable, and unbiased resource that can be referred to by nations hoping to improve their Halal Ecosystems through strategic planning and the promotion of Halal commerce through the use of cooperation, strategic alliances, and other similar means. This study has the potential to improve the government's and authority's recommendations about the expansion of Micro SMEs and SMEs, the significance of halal parks, and the priority given to the development of the Halal sector.

Having analyzed these traits will help the Halal industry take off in the selected countries very quickly. With HDC's 10 Global Halal Ecosystem Indicators, the country may better identify and prioritize issues affecting the Halal industry. A well-defined system will also help the country spot other opportunities to strengthen its Halal industry. The end outcome of this will be more sound methods for creating long-term plans in the Halal sector.

5. Conclusion

The purpose of this research to serve as a useful, actionable, and unbiased resource that the selected European countries (countries that participated in the survey) may utilize to inform their long-term strategy for building a Halal ecosystem and easing Halal trade. The study also aspires to identify and map preexisting (decentralized and/or centralized) Halal Ecosystems. The study utilizes the HDC Global Halal Ecosystem Indicators created by Halal Development Corporation (HDC) as a starting point for analyzing the prospects for bolstering global halal ecosystems. This study will pave the way for the development of a Halal Ecosystem strategy applicable to the Halal sectors in the target countries

We foresee the "Halal Ecosystem" becoming a defining paradigm in worldwide commerce, finance, and economic growth. Since there is a dearth of scholarly literature on halal ecosystems, this paper serves as a vital and useful resource for scholars and students in fields as diverse as economics, business, international development, international relations, corporate communication, and Islamic branding and marketing.

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Benchmarking halal ekosistema evropskih zemalja sa drugim regionima koristeći 10 HDC-vih indikatora halal ekosistema

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Pregledni rad

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U ovom radu ćemo naglasiti važnost "halal ekosistema" za islamsku ekonomiju. U tu svrhu, provedena je anketa koja ima za cilj da služi kao koristan, efikasan i nepristrasan izvor koji odabrane evropske zemlje (zemlje koje su učestvovala u anketi) mogu koristiti za informisanje o dugoročnoj strategiji izgradnje halal ekosistema i olakšavanja halal trgovine. Studija također ima za cilj identificirati i mapirati postojeće (decentralizovane i/ili centralizovane) halal ekosisteme. Studija koristi HDC Global Halal Ecosystem Indikatore koje je kreirala Halal Development Corporation (HDC) kao polaznu tačku za analizu izgleda za jačanje globalnih halal ekosistema. Predviđamo da će "Halal ekosistem" postati definirajući paradigma u svjetskoj trgovini, finansijama i ekonomskom rastu. Ova studija će utrti put razvoju strategije halal ekosistema koja se može primijeniti na halal sektore u ciljanim zemljama.

JOURNAL OF HALAL QUALITY AND CERTIFICATION

Halal accreditation requirements from the perspective of halal certification bodies

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ABSTRACT

The halal market is growing rapidly due to the increasing Muslim populations and the rising awareness of both Muslims and non-Muslims about the benefits of halal products for human health. While food still dominates the halal market, the market has expanded to include pharmaceuticals, cosmetics, health products, toiletries, and medical devices. However, the lack of clear regulatory frameworks for certification, standardization, and accreditation remains a major challenge in the industry. Although halal is clearly defined in the sources of Islam, there is no unique world halal standard for halal certification.. To address this issue, halal accreditation for halal certification bodies has been implemented worldwide in recent years. According to Croatian Accreditation Agency accreditation is a procedure by which an accreditation body evaluates a particular institution and confirms that it is professionally and technically capable to work in accordance with internationally accepted rules (Hrvatska akreditacijska agencija, 2023). Halal certification bodies undergo rigorous and complex accreditation requirements to ensure that halal products can be exported without any hindrance. However, this research reveals that the multiplicity of halal standards is a significant obstacle to the smooth functioning of export activities. The main focus of this research was on halal certification bodies to determine whether the regulation of the halal market with accreditation processes is on the right track. The results showed that there is a need for international alignment of halal accreditation processes to address this obstacle.

Introduction

Halal certification has been in place for several decades, resulting in an increased number of halal products and services on the market (Abdul Rahim, 2013). According to IMARC Group analysis the current global halal food market

value for 2022 is estimated to be USD 2.3 billion¹. Despite the ever-present threat of recession, inflation, and perhaps even stagflation, the halal market is rapidly growing and developing, proving to be highly resilient to crises. This tremendous rise from a small niche market to a multibillion-dollar industry

¹ IMARC Group provides an analysis of the key trends in each sub-segment of the global halal food

market report, along with forecasts at the global and regional level from 2023-2028.

undeniably positions halal between religious obligation and business opportunity for halal certification and standardisation bodies. Back in 2014 it was estimated that there were over 400 halal certification bodies worldwide (Halal Focus, 2014), most of which follow their own

guidelines for halal certification. However, as of today, it is difficult to provide an exact number of halal certification bodies in the world as new ones may be established and others may become inactive.



Fig. 1 Different types of halal logotypes on the market (Dugonjić, 2019)

The issue of self-declared halal certification bodies is a significant problem in the industry. Many private companies declare themselves as authorized halal certification bodies without any official recognition, leading to a lack of credibility and halal integrity in the certification process. Even some typical HCB-s practices potentially jeopardize integrity and safety of the halal market (Abdallah, 2021). In contrast, legitimate halal certification bodies undergo rigorous accreditation requirements to ensure that halal products can be exported without any barriers. To address this problem, most governments of leading global halal markets have established decrees requiring companies to obtain a Halal Certificate issued by an accredited certification body for that specific market. However, it is important to note that there is no universal recognition of Halal accreditation in all export markets. Despite various efforts to standardize halal certification processes and establish a unified set of halal standards, these attempts have not yielded the desired outcomes (Abdallah et al., 2021). Therefore, the issue of self-declared certification bodies and lack of

recognition of Halal accreditation remains a challenge for the halal industry.

This research involved the use of questionnaires obtained from 32 representatives of halal certification bodies across various countries including Austria, the Netherlands, France, Poland, Belgium, the United Kingdom, Turkey, Australia, Brazil, the United States, Montenegro, Bosnia and Herzegovina, and Slovenia. These certification bodies have undergone accreditation processes in different markets. The data collected from the questionnaires was analysed using pie charts to identify key variables and trends in the responses. This paper contributes to the literature by analyzing questionnaire data from 32 representatives of halal certification bodies from various countries. The findings suggest that the multiplicity of halal standards is a significant obstacle to the smooth functioning of export activities. While halal accreditation is necessary to regulate the market, there is a need for consensus among accreditation bodies to reduce the cost and complexity of the accreditation process. The remainder of the paper is structured as follows: Section 2 provides an overview of halal accreditation bodies, Section 3 discusses the

data and variables used in the study, Section 4 presents the results, and the final section is a conclusion.

1.1 Overview of Halal Accreditation Bodies

Over the past decade, there has been significant progress in developing national and international halal standards for various industries, including food, tourism, and cosmetics. Similarly, there have been efforts to establish standards for halal accreditation bodies and certification processes. The acknowledgement of diverse halal standards worldwide is achieved through the accreditation of Halal Certifying Bodies (HCBs) in various countries (Azam and Abdullah, 2021). The leading halal markets have established the following accreditation bodies:

SMIIC

The Standards and Metrology Institute for the Islamic Countries (SMIIC), which is headquartered in Turkey, is an intergovernmental regional standardization organization. While it is not a certification body itself, it provides global accreditation to Halal Certification Bodies (HCBs) (Azam and Abdullah, 2021). Standards and Metrology Institute for the Islamic Countries (SMIIC) has developed and published a set of halal standards. SMIIC's halal standard is the sole endeavor seeking to establish a worldwide standardization and accreditation system in halal certification, allowing halal products to be easily transported across various countries based on OIC/SMIIC standards and reference documents (Azam and Abdullah, 2021).

Moreover, another endeavor for harmonisation of halal standards was shown by establishing the International Halal Accreditation Forum, headquartered in Dubai,

EIAC

Emirates International Accreditation Centre (EIAC) is a governmental body in Dubai responsible for accrediting Conformity Assessment Bodies (CABs), including both governmental and private entities, within the UAE and abroad. EIAC's scope of accreditation also covers laboratories (EIAC, 2023). The Emirates International Accreditation Center (EIAC) has played a significant role in the halal accreditation process by issuing 57 halal accreditations to Conformity Assessment Bodies

(CABs), both governmental and private, (EIAC, 2023).



Fig. 2: Emirates International Accreditation Center logo (EIAC, 2023)

JAKIM

The Department of Islamic Development Malaysia (Jabatan Kemajuan Islam Malaysia or JAKIM) is the agency responsible for Islamic affairs, including halal certification in Malaysia. JAKIM's responsibility is to ensure that Muslim consumers are provided with halal products as mandated by Sharia law. To achieve this, JAKIM conducts official site inspections at every stage and process of the production to ascertain the halal status of the product. This includes examining how the halal status of the raw material is maintained and monitored at all times. It has recognized 83 Halal Certification Bodies/Authorities from 46 countries as of March 17th, 2023 (JAKIM, 2023).



Fig. 3: JAKIM logo (JAKIM, 2023)

SFDA

The Saudi Food and Drug Authority (SFDA) is an independent corporate body that reports directly to the President of the Council of Ministers. It has taken over the procedural, executive, and supervisory responsibilities that were previously handled by other agencies. The main objective of SFDA is to ensure the safety of food, drugs for humans and animals, biological and chemical substances, and electronic devices related to human health (SFDA, 2023). As part of the Saudi Arabian government's amendment, the

SFDA (Saudi Food and Drug Authority) established a Halal Center to approve foreign halal certification authorities. This means that foreign halal certification bodies must receive approval from the SFDA for their halal certificates to be recognized within the Kingdom of Saudi Arabia. Additionally, halal certification bodies must be registered and approved by the Saudi Standards, Metrology, and Quality Organization (SASO). (SFDA, 2023).



Fig. 4: Saudi Food & Drug Authority logo (Alharf, A. et al., 2018)

HAK

The Halal Accreditation Agency (HAK) was established to operate in the field of halal accreditation both in Turkey and globally. As the only authorized institution to accredit halal conformity assessment bodies in Turkey, HAK aims to represent Turkey in international platforms related to halal accreditation and to act as a pioneer in this sphere (HAK, 2023).



Fig. 5: Halal Accreditation Agency logo (HAK, 2023)

MUI & BPJPH

The halal certification process in Indonesia involves two key stakeholders: the MUI and the National Food and Drug Control Agency of Indonesia (BPOM). The MUI's role remains essential in the halal certification process in Indonesia, as per Law No. 33/2014. The BPJPH will primarily act as a regulatory authority, with the power to create, revoke, and manage all aspects of local and imported goods' halal certification (MUI & BPJPH, 2023).



Fig. 6: MUI & BPJPH logo (MUI & BPJPH, 2023)

The acceptance of halal products in a country is affected by the recognition of the Halal Certifying Body (HCB), and only products certified by recognized HCBs are accepted (Evrin Lutfika et al., 2022). The process of halal accreditation requires certification bodies to apply for registration and undergo an assessment visit from relevant authorities. However, one important issue with both recognition and accreditation processes is that they do not always follow international standards and the Multilateral Recognition Arrangement. Ensuring consistency and reliability in the halal certification process requires the inclusion of this essential component. As members of the International Accreditation Forum (IAF), the accreditation bodies abide by the same procedures and documentations under a Multilateral Recognition Arrangement (MLA). The purpose of the MLA is to allow accreditations and the certificates issued by certification / registration bodies accredited by members of the IAF to be recognized by the other members of the IAF (IAF, 2023)

As more OIC member states begin to adopt halal accreditation standards, it is worth noting that while a halal certification body may be accredited by an accreditation body in one OIC country, it may not necessarily be recognized in another OIC member country, even if the standards and accreditation process are similar or require only minimal additional registration for the halal certification body. For example, a European exporter obtained certification from a Halal Quality Certification Body authorized and approved in their country. They ensured that their plants were certified before exporting products to Turkey. However, despite possessing a Halal certification, the exporter was unable to sell products in GCC countries due to a lack of

accreditation for the GCC market. This has been an ongoing barrier that has prevented them from conducting business in the GCC, costing the business more than 20,000 €. Although Halal Certifying Bodies (HCBs) in different countries use one or more standards as a basis to issue halal certificates, they utilize their own halal logos in packaging and labeling, causing confusion among consumers (Azam and Abdullah, 2021). Therefore, the main barrier that has emerged is the lack of international alignment between Halal Accreditation Bodies.

Materials and methods

This research uses questionnaires obtained from 32 representatives of halal certification bodies from Austria, the Netherlands, France, Poland, Belgium, the United Kingdom, Turkey,

Australia, Brazil, the United States, Montenegro, Bosnia and Herzegovina, and Slovenia that have gone through the accreditation process in different markets. The variables in the questionnaires are analysed using pie charts.

The aim of this research is to determine whether the current regulation of the halal market is effective and appropriate.

Results and discussion

The process of halal accreditation primarily concerns halal certification bodies. Therefore, the focus of this research, conducted through questionnaires, was directed towards halal certification bodies to determine the advantages and disadvantages of halal accreditation.

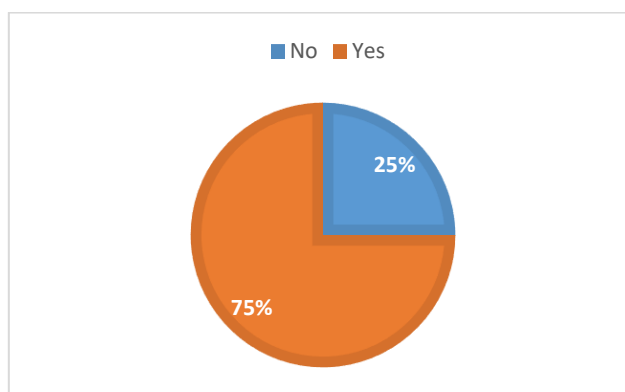


Fig. 7 Distribution of answers to the Question 1: Have you obtained any halal accreditation?

The majority of respondents in this research, 75%, confirmed that they had undergone at least

one accreditation process, placing them in the majority group.

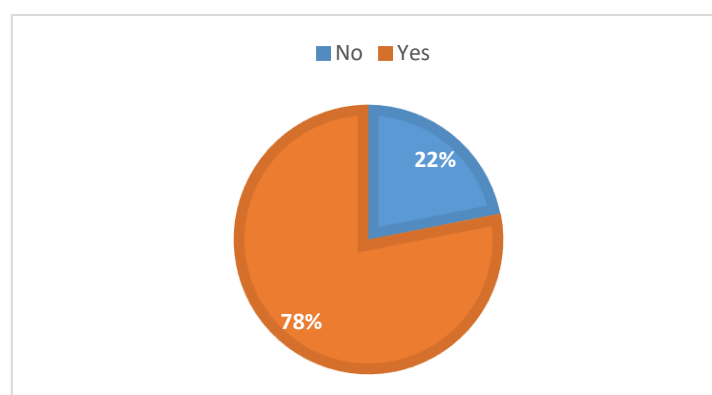


Fig. 8 Distribution of answers to the Question 2: Do you think accreditation is necessary for HCB?

A significant majority of respondents, 78.1%, agreed that accreditation is necessary to regulate

the halal market, while 21.9% were opposed to the idea.

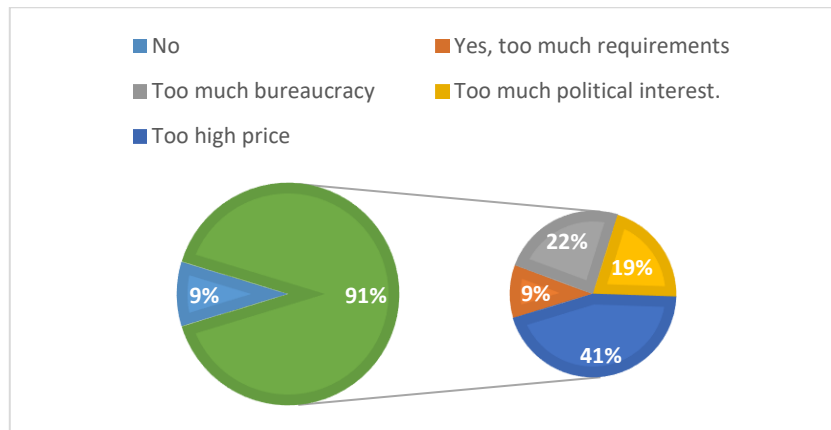


Fig. 9 Distribution of answers to the Question 3: Does current accreditation process in your opinion have same disadvantages?

Regarding the challenges associated with halal accreditation, 40.6% of respondents believed that the cost of accreditation is too high. 21.9% agreed that there is too much bureaucracy involved in the process, while 18.8% believed that there is too

much political interest. In addition, 9.4% of respondents found the process too complex due to excessive requests. On the other hand, 9.4% of respondents believed that halal accreditation is appropriate and has no disadvantages.

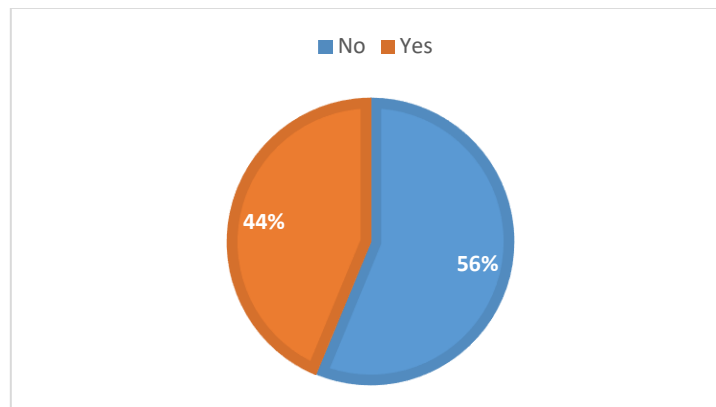


Fig. 10 Distribution of answers to the Question 4: Do you think that the development of halal accreditation process is on the right path?

Regarding the development of halal accreditation, 56.3% of the respondents disagreed

that it was on the right track, whereas 43.8% believed it was.

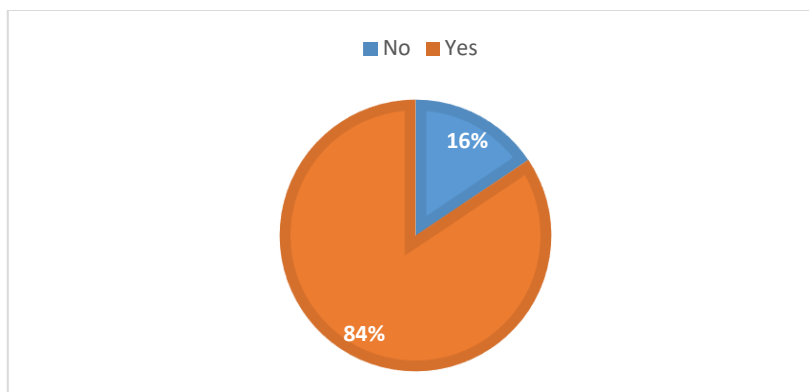


Fig. 11 Distribution of answers to the Question 5: Does halal accreditation obtained from one of the OIC countries in your opinion should be recognised in all OIC countries?

According to the questionnaire results, 84.4% of the respondents confirmed that having an internationally recognized accreditation is

necessary, while 15.6% stated that there is no need for international recognition.

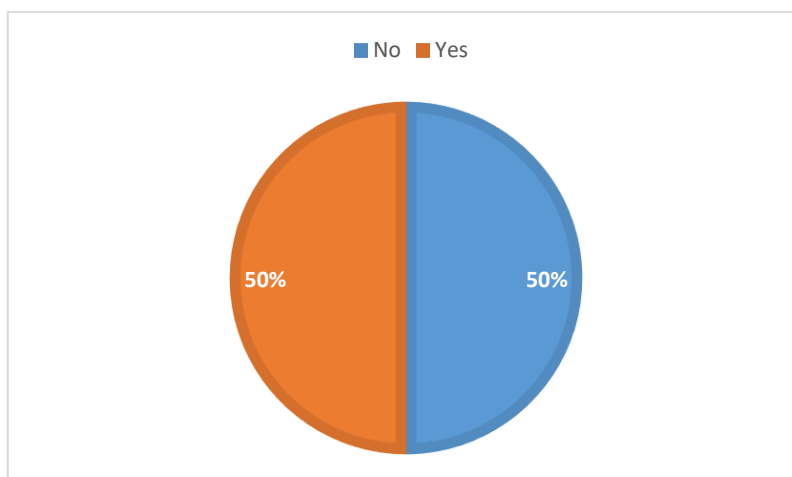


Fig. 12 Distribution of answers to the Question 6: Do you think it is necessary to establish a halal accreditation body in non-OIC countries such as the EU or US?

The questionnaire revealed that respondents were equally divided in their opinions, with 50% agreeing and 50% disagreeing with the statement.

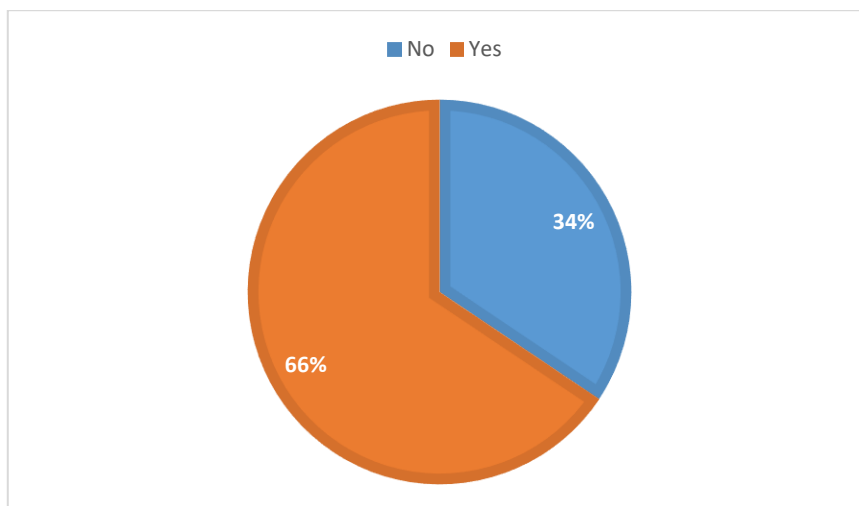


Fig. 13 Distribution of answers to the Question 7: In your opinion is there a need to accredit/recognize halal certificates from OIC countries for products sold in non-OIC countries?

According to the questionnaire, 65.6% of the respondents stated that there is a need to accredit/recognize halal certificates from OIC

countries for products sold in non-OIC countries, while 34.4% believe that there is no need for such accreditation/recognition.

Conclusions

The field of halal certification accreditation is a novelty that has emerged in recent years and a promising sign of improved regulation in the halal market. By aligning and implementing national, regional, and global initiatives for halal certification and accreditation, we can address the regulatory gaps in this market. Questionnaire results suggest that accrediting halal certification bodies, particularly through the accreditation bodies of halal product importers, can effectively regulate the halal market. For greater impact, it is essential that halal accreditations be universally recognized across all countries. Overall, effective regulation and accreditation are critical to ensuring the integrity and growth of the halal market (Dugonjić, 2019).

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Zahtjevi halal akreditacije iz perspektive halal certifikacijskih tijela

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Pregledni rad

PODACI O RADU

SAŽETAK

Ključne riječi:

halal certifikacija, halal akreditacija, međunarodno priznati standard, uniformiranost,

Halal tržište bilježi sve veći rast kako zbog porasta muslimanske populacije tako i zbog sve veće svijesti i muslimana i nemuslimana o dobrobitima halal proizvoda za ljudsko zdravlje. Iako hrana i dalje dominira halal tržištem, tržište se proširilo na farmaceutske proizvode, kozmetiku, zdravstvene proizvode, toaletne potrepštine i medicinske uređaje. Međutim, nedostatak jasnih regulatornih okvira za certifikaciju, standardizaciju i akreditaciju ostaje veliki izazov u industriji. Iako je halal jasno definiran u izvorima islama, ne postoji jedinstveni svjetski halal standard za halal certifikaciju. Kako bi se riješio ovaj problem, posljednjih godina vodeće svjetska halal tržišta implementirale su halal akreditaciju za halal certifikacijska tijela. Prema Hrvatskoj akreditacijskoj agenciji akreditacija je postupak kojim akreditacijsko tijelo ocjenjuje određenu instituciju i potvrđuje da je stručno i tehnički sposobna za rad u skladu s međunarodno prihvaćenim pravilima (Hrvatska akreditacijska agencija, 2023). Tijela za halal certificiranje podliježu rigoroznim i složenim zahtjevima akreditacije kako bi se osiguralo da se halal proizvodi mogu izvoziti bez ikakvih prepreka. Međutim, ovo istraživanje otkriva da je neujednačenost i prisutnost velikog broja halal standarda značajna prepreka neometanom odvijanju izvoznih aktivnosti. Glavni fokus ovog istraživanja bio je na halal certifikacijskim tijelima kako bi se utvrdilo je li regulacija halal tržišta s procesima akreditacije na dobrom putu. Rezultati su pokazali da postoji potreba za međunarodnim usklađivanjem procesa halal akreditacije kako bi se riješila ova prepreka.

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