UNIVERSITY of WORCESTER

An Exploration of Halal Requirements and the Response to Them in German Chemical-Pharmaceutical Manufacturing Sector

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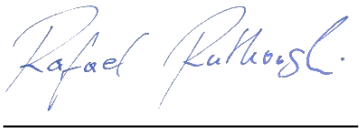
AUTHORS' DECLARATION

I declare that this Doctor of Business Administration thesis is my own work and that all sources literary and electronic have been properly acknowledged as and when they occur in the body of the text. Any views expressed in the thesis are those of the author and in no way represent those of the University.



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Abstract

The Islamic economy, and in particular the halal market for cosmetics and pharmaceuticals, continues to experience dynamic global growth, offering significant long-term potential for the German chemical-pharmaceutical sector. Access to this market requires not only compliance with technical standards, but also a nuanced understanding of religious, cultural, and regulatory requirements.

This dissertation systematically investigates the foundations, challenges, and practical implications of halal certification in this regulated industrial sector. Drawing on a comprehensive international comparison, five benchmark countries—Malaysia, Indonesia, Singapore, Turkey, and the United Arab Emirates—were identified as reference systems with the strictest and most systematised halal certification frameworks. These served as the empirical basis for the development of a structured halal checklist, which supports companies in the transparent and standardised implementation of halal certified processes.

To address the research objectives, three core research questions were posed:

1. What are the religious, cultural, and regulatory requirements for halal certification of chemical and pharmaceutical goods?
2. What are the key challenges and opportunities for the German chemical-pharmaceutical sector in aligning with the requirements of the halal market?
3. What systematic guidelines can be developed to help the German chemical-pharmaceutical manufacturing sector successfully tap into the potential of the halal market?

A mixed-methods design, rooted in a pragmatic research paradigm, was applied. Qualitative in-depth interviews served as the primary data collection method, offering rich insights into the complexities of halal certification. These findings were complemented by a quantitative internet questionnaire to validate the qualitative results. The triangulation of these data sources enabled a comprehensive and methodologically coherent analysis, ensuring both empirical depth and sectoral applicability.

The findings demonstrate that halal certification extends beyond technical conformity and is embedded in a broader socio-religious and economic context. It is understood by both consumers and regulators as a marker of trust, ethical production, and religious legitimacy. The study's core output—a five-step implementation guideline, operationalised through a category-

based halal checklist—provides companies with a structured and audit-compatible approach for integrating halal certification into existing quality and governance systems.

The five thematic pillars of the guideline include: (1) raw materials and ingredients, (2) logistics and warehousing, (3) manufacturing and processing, (4) audits and documentation, and (5) GMOs and enzymes. These are grounded in the strictest halal requirements observed internationally and translated into a sector-specific implementation approach. In addition, the study recommends engaging with specialised halal service providers to support regulatory alignment and process integration.

In conclusion, this research offers a theoretically grounded and practically validated contribution to the discourse on halal governance in industrial settings. By linking Islamic legal requirements with operational management tools, it delivers a robust framework for companies seeking both compliance and strategic differentiation in global halal markets.

Keywords: *Halal requirements, halal certification, halal checklist, chemical-pharmaceutical industry, Islamic economy, international comparison, systematic implementation guideline.*

Dedication

This thesis is dedicated to my wife

Natalie Schröder

and my daughter

Xenia Schröder

Their unwavering patience, love and support
carried me through this demanding period.

In the most difficult moments,
their confidence and joy gave me strength.

Their commitment and optimism
continue to inspire me every day
on the path I have chosen.

Acknowledgment

I would like to express my sincere gratitude to my supervisors, Dr Abdulmaten Taroun and Professor Edward Ochieng, for fostering a highly constructive working relationship and for their consistent support throughout this research. Their academic guidance, encouragement, and insightful feedback have been a continuous source of motivation and have helped me navigate the complexities of the subject matter with greater clarity.

I am deeply grateful to my wife, Natalie Schröder, and my daughter, Xenia Schröder, for their patience, constructive feedback, and unwavering support. Their thoughtful perspectives and constant encouragement have been invaluable—especially during the more challenging moments when it was difficult to see a way forward. Their belief in me gave me strength, and their enthusiasm reminded me why I chose this path.

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A special expression of thanks goes to my late father, Marek Rutkowski (†), who always took pride in my achievements. Although he is no longer here to witness this milestone, his memory continues to inspire and accompany me.

Finally, I extend my sincere thanks to all those who contributed to this research. Whether through interviews, discussions, or other forms of support, your involvement was invaluable and is deeply appreciated.

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Abbreviations

Abbreviation	Description
BMFSFJ	Bundesinnenministerium für Familie, Senioren, Frauen und Jugend (Federal Ministry of the Interior for Family Affairs, Senior Citizens, Women and Youth)
BMZ	Bundesministeriums für wirtschaftliche Zusammenarbeit und Entwicklung (Federal Ministry for Economic Cooperation and Development)
BPJPH	Badan Penyelenggara Jaminan Produk Halal, Indonesia
FDR (BRD)	Federal Republic of German (Bundesrepublik Deutschland)
CAGR	Compound Annual Growth Rate
CO_2	Carbon Dioxide
CS	Chemical Sector
ESG	Environmental, Social, and Governance (Objectives)
ESMA	Emirates Authority for Standardisation and Metrology
EU	European Union
GDPR	General Data Protection Regulation
GDR (DDR)	German Democratic Republic (Deutsche Demokratische Republik)
GIEI	Global Islamic Economy Indicator
GMP	Good Manufacturing Practice
GTAI	Germany Trade & Invest
GRV	Gesetzliche Rentenversicherung (Public Pension Insurance)
JAKIM	Jabatan Kemajuan Islam Malaysia
HAK	Halal Accreditation Agency (Turkey)
HAS	Halal Assurance System
HalMQ	Halal Quality Management System
HACCP	Hazard Analysis and Critical Control Points
HARA	Hazard Analysis and Risk Assessment
JUM	Jamiat Ulama - E - Maharashtra

LPPOM MUI	Lembaga Pengkajian Pangan Obat-obatan dan Kosmetika Majelis Ulama Indonesia
MUIS	Majelis Ugama Islam Singapore
MPPHM	Manual Prosedur Pensijilan Halal Malaysia
OECD	Organisation for Economic Co-operation and Development
OIC	Organisation of Islamic Cooperation
P	Participant
PIS	Participant Information Sheet
PS	Pharmaceutical Sector
R	Researcher
RQ	Research Questions
R&D	Research and Development
SMIIC	Standards and Metrology Institute for Islamic Countries
SOP	Standard Operation Procedure
SPSS	Statistical Package für Social Sciences
QMS	Quality Management System
UAE	United Arab Emirates
UN	United Nations
UoW	University of Worcester
VCI	Verband der chemischen Industrie (Association of the Chemical Industry)

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1 INTRODUCTION TO THE RESEARCH

1.1 Introduction

The requirements of the chemical-pharmaceutical market are constantly evolving. Digitalisation, shifting regulatory frameworks, and rising consumer expectations increasingly influence how companies approach raw material sourcing, technological innovation, product development, and sustainability (Bünger, 2022; VCI, 2022a). While change is generally considered an inherent characteristic of the chemical-pharmaceutical sector, companies now face sensitive strategic and operational pressure due to intensifying global competition, stricter compliance obligations, and growing consumer demand for transparency, sustainability, and cultural sensitivity.

One emerging development of increasing relevance is the rising demand for halal certification of chemical and pharmaceutical goods, as required by Muslim consumer groups (Evans and Syed, 2015; HDC, 2016; Dinar Standard, 2022, 2023). These halal requirements are rooted in religious and cultural principles, whose interpretation varies between certification bodies and national jurisdictions. In addition to compliance with Islamic legal norms, a broader awareness of ethical and cultural values among Muslim consumers has further reinforced this trend (Evans and Syed, 2015; Akram, 2022).

This is particularly evident in areas such as ingredient origin, production conditions, and traceability standards, which constitute core domains of halal certification.

The halal market also holds strong economic potential, not only due to the above-average population growth among Muslim communities (Pew Research Center, 2015; PRB, 2015), but also due to its relevance for the German chemical-pharmaceutical manufacturing sector (VCI, 2022b; Dinar Standard, 2023). German manufacturers are increasingly acknowledging the strategic importance of halal certification—not only as a means of ensuring global market access, but also to reduce competitive disadvantages vis-à-vis companies in Muslim-majority countries, where halal certification is already a standard market requirement (HDC, 2012; Evans and Syed, 2015; Dinar Standard, 2021, 2022).

Despite this growing awareness, the implementation of halal certification in the German chemical-pharmaceutical sector remains fragmented and inconsistent. Many companies continue to rely on ad hoc certification strategies, often engaging individual certification bodies without a long-term framework. This approach entails significant risks, given the lack of mutual recognition between halal certification bodies and differences in accreditation processes (Rahem, Effendi and Faridah, 2021).

Additionally, interpretations of core requirements—such as the handling of animal-derived raw materials or the use of ethanol-based production aids—vary significantly across countries and certifying institutions (Kadir *et al.*, 2016; Hassan and Harun, 2018).

These uncertainties cluster around five key audit domains: (1) raw materials and ingredients; (2) logistics and warehousing; (3) manufacturing and processing; (4) audits and documentation; and (5) GMOs and enzymes.

These categories will serve as the analytical structure throughout this thesis.

This situation reveals a fundamental implementation gap: there is no operational, evidence-based framework tailored to the regulatory and structural realities of the German chemical-pharmaceutical sector. Existing resources tend to be generic or focused primarily on sectors such as food.

To address this deficit, the present study analyses the religious, cultural, and regulatory underpinnings of halal certification, identifies the strictest international halal standards, and assesses their relevance for the German industrial context. Particular focus is given to the regulatory systems of five benchmark countries, namely Malaysia, Singapore, Indonesia, Turkey and the United Arab Emirates, in order to enable systematic cross-national comparison.

To translate these regulatory insights into actionable business guidance, this research adopts a pragmatic mixed-methods design. Following a sequential logic (qual → quant), in-depth interviews provided contextual understanding, which was then validated by a quantitative internet questionnaire targeting a broader sample of industry and certification stakeholders.

The triangulation of qualitative and quantitative data facilitated the development of a robust, empirically grounded implementation guideline. This guideline is structured around the five core certification domains and integrates international halal governance expectations with the operational realities of German industry actors.

The exploratory nature of this study allowed for the identification of new thematic clusters, stakeholder perspectives, and context-specific interpretations of halal principles. Rather than testing a predefined hypothesis, the research follows an inductive logic, reflecting the regulatory diversity, religious plurality, and organisational complexity of the field.

The result is a five-step guideline designed to help companies achieve halal certification in a transparent, auditable, and operationally feasible way. Beyond aligning with international standards, the study offers practical recommendations for embedding halal principles into corporate processes and engaging effectively with certification bodies. At the heart of this approach is a structured halal checklist, developed specifically for the chemical-pharmaceutical

context, which translates abstract normative expectations into concrete implementation categories.

Taken together, this dissertation offers a dual contribution, both conceptual and practical, to strengthening the competitiveness, regulatory compliance and intercultural competence of the German chemical and pharmaceutical sector within the global halal market.

1.2 Research Aims and Objectives

The aims of this dissertation are to explore the religious, cultural, and regulatory requirements for halal certification in the chemical-pharmaceutical sector, and to examine how the German industry can effectively respond to these multifaceted demands. By drawing on cross-national regulatory comparisons and triangulated empirical data, the study aims to develop a systematic, practice-oriented implementation guideline based on a structured halal checklist, designed to support companies in both achieving certification and strategically positioning themselves within the global halal market.

To achieve this aim, the study pursues the following objectives:

1. To identify and analyse the religious, cultural, and regulatory requirements for halal certification relevant to chemical and pharmaceutical products.
2. To assess the principal challenges and opportunities faced by the German chemical-pharmaceutical sector in aligning with these halal requirements.
3. To develop a systematic and empirically validated implementation guideline, grounded in a structured halal checklist that reflects the most stringent international benchmarks, for use by German manufacturers.

1.3 Research Questions

The following research questions guide the investigation and form the analytical framework for addressing the study's aims.

1. What are the religious, cultural, and regulatory requirements for halal certification of chemical and pharmaceutical goods?
2. What are the key challenges and opportunities for the German chemical-pharmaceutical sector in aligning with the requirements of the halal market?
3. What systematic guidelines can be developed to help the German chemical-pharmaceutical manufacturing sector successfully tap into the potential of the halal market?

1.4 Research Focus Areas

The thematic focus areas of this dissertation are directly aligned with the three research questions.

RQ1: What are the religious, cultural, and regulatory requirements for halal certification of chemical and pharmaceutical goods?

Chapter 2 provides the theoretical foundation and methodological framework for exploring halal requirements. Section 2.1 introduces the study's relevance, scope, and interdisciplinary design. Subsection 2.1.1 discusses the religious, cultural, and economic dimensions of halal, while Subsection 2.1.2 sets out the methodological steps used to identify international halal standards. Subsections 2.1.3 to 2.1.5 describe the research design, selection of benchmark countries, and academic contribution.

The literature review developed across these sections forms the conceptual basis for RQ1 and also supports RQ2. Section 2.2 outlines halal as both a religious and economic concept. Section 2.3 reviews halal governance and certification practices in the five benchmark countries—Malaysia, Singapore, Indonesia, Turkey, and the UAE. Section 2.4 compares these national systems across five key audit categories: (1) raw materials and ingredients, (2) logistics and warehousing, (3) manufacturing and processing, (4) audits and documentation, and (5) GMOs and enzymes.

Section 2.5 consolidates these insights into a structured halal checklist (Subsection 2.5.2), which reflects the strictest international standards and serves as a key analytical reference for the implementation framework developed in later chapters.

RQ2: What are the key challenges and opportunities for the German chemical-pharmaceutical sector in aligning with the requirements of the halal market?

Sections 2.6 to 2.9 explore the institutional, societal, and strategic factors that influence halal certification in the German context. These include demographic developments and historical dynamics (Section 2.7), market demand and future trends (Section 2.8), and organisational structures and strategic alignment (Section 2.9).

The German chemical-pharmaceutical sector is treated as an exploratory case study due to its regulatory complexity, technological specialisation, and strong international orientation. This approach allows for the generation of context-specific insights and informs the development of practice-relevant recommendations.

RQ3: What systematic guidelines can be developed to help the German chemical-pharmaceutical manufacturing sector successfully tap into the potential of the halal market?

To answer this question, the study presents a structured, practice-oriented guideline that supports manufacturers in meeting halal certification requirements. This guideline is a key outcome of the research and is based on a synthesis of regulatory insights, academic literature, and international best practices from the five benchmark countries.

The guideline builds on the halal checklist developed in Section 2.5 and organises it into five practical certification categories, which serve as the basis for implementation logic. These categories are operationalised into concrete steps that reflect international benchmarks and are adaptable to the organisational realities of German manufacturers.

In addition to meeting technical compliance, the guideline also explores how halal requirements can be integrated into existing quality management systems (e.g. ISO, GMP, internal audit routines). It further provides recommendations on strategic governance integration, stakeholder engagement, and long-term organisational planning.

To ensure practical relevance and empirical validity, the guideline is grounded in a mixed-methods approach, combining in-depth interviews and an internet questionnaire. This triangulation ensures both theoretical rigour and practical applicability.

1.5 Abridged Research Method and Strategy

This study adopts an interpretivist research paradigm, recognising that halal is a socially constructed, culturally embedded, and context-specific concept. A qualitative, inductive, and exploratory orientation was chosen to identify emerging patterns and stakeholder perspectives within a largely under-researched industrial context.

To enhance practical relevance and methodological flexibility, a pragmatist perspective complements this orientation. This allows for the integration of both qualitative and quantitative methods, based on their suitability for addressing the research aims and questions. The study follows a sequential mixed-methods design (qual → quant). First, a series of in-depth interviews was conducted to explore how halal is interpreted, implemented, and governed across different organisational settings. Second, a quantitative internet questionnaire was used to validate the qualitative findings and broaden the empirical base.

The research is structured as a case study, focusing on the German chemical-pharmaceutical sector. This sector was selected due to its high regulatory complexity, strong international orientation, and increasing exposure to religious and ethical product standards. The case study

approach made it possible to develop a nuanced understanding of sector-specific challenges while still enabling the derivation of transferable insights.

Sampling for the in-depth interviews followed a purposive strategy, aimed at capturing diverse institutional and operational viewpoints. In contrast, the internet questionnaire employed a random sampling approach to reach a broader respondent base. The study uses a cross-sectional design, offering a contextualised snapshot of current practices, challenges, and interpretations within the field.

No predefined hypotheses were used. Instead, the study pursued the development of empirically grounded, practice-oriented recommendations, tailored to the realities of the chemical-pharmaceutical sector.

The figure below summarises the overall research approach and strategy. A more detailed explanation follows in Chapter 3.

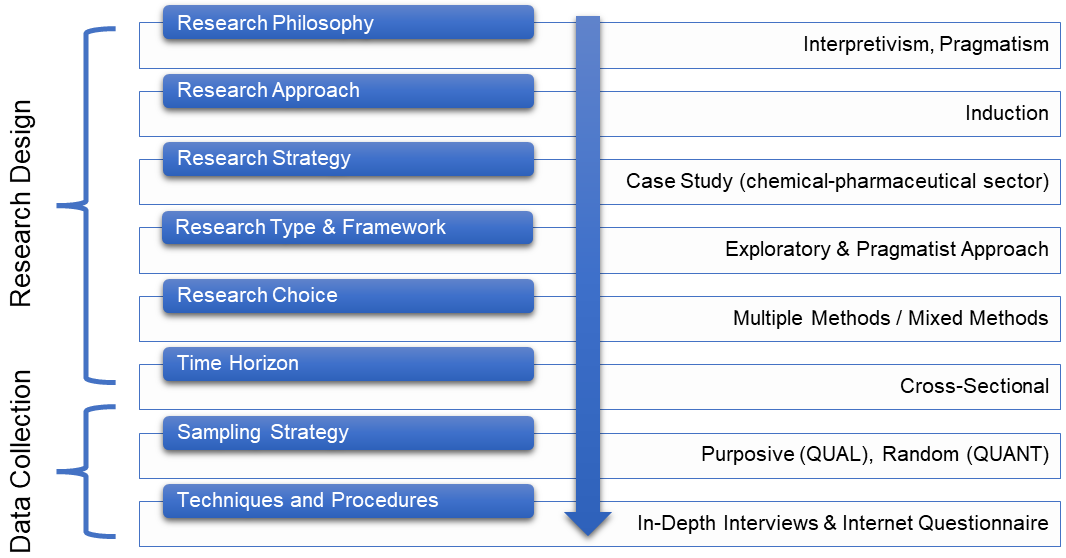


Figure 1-1: Chosen approaches – from research philosophy to research technique (Rutkowski, 2024)

1.6 Dissertation Structure

This dissertation is structured into six main chapters and an appendix, each addressing a specific stage of the research process and contributing to the overarching objective of developing a strategically grounded and operationally applicable guideline for halal certification in the German chemical-pharmaceutical sector. The structure reflects the logic of the three research questions (RQ1–RQ3) and aligns with the triangulated mixed-methods design adopted in the study.

Chapter 1: Introduction

This opening chapter outlines the motivation for the research, states the aim and objectives, and introduces the research questions. It explains the relevance of the chosen sector and presents both the methodological approach and the overall structure of the study.

Chapter 2: Literature review

This chapter establishes the theoretical and contextual foundation of the research. It introduces the religious, cultural, and economic significance of halal certification and analyses governance structures and regulatory frameworks in five benchmark countries—Malaysia, Singapore, Indonesia, Turkey, and the UAE. It also examines the relevance and challenges of the German chemical-pharmaceutical sector in relation to halal requirements.

The chapter is divided into two parts:

- Sections 2.1–2.5 focus on international halal requirements and frameworks; and
- Sections 2.6–2.9 examine the German context and sector-specific challenges.

The analytical structure (Section 2.4) is guided by five internationally recognised halal audit categories:
(1) raw materials and ingredients; (2) logistics and warehousing; (3) manufacturing and processing; (4) audits and documentation; and (5) GMOs and enzymes. These categories enable a comparative evaluation of halal requirements and serve as the analytical backbone of the entire study.

Based on this comparative assessment, a category-based halal checklist is developed, integrating the most stringent international requirements into a unified, audit-ready framework. The chapter concludes by identifying theoretical and practical research gaps and laying the conceptual groundwork for answering RQ1 and RQ2.

Chapter 3: Research methodology

This chapter presents the research philosophy and methodological strategy. It discusses the exploratory and pragmatist underpinnings of the study and explains the sequential mixed-methods design (qual → quant). The methods applied, including in-depth interviews and a quantitative internet questionnaire, are explained in detail, covering sampling, data collection and analysis procedures.

It also outlines how triangulation integrates cultural, operational, and regulatory insights and contributes to the validity and relevance of the research outcomes. Ethical considerations, coding strategies, and quality criteria such as reliability and transparency are also addressed. This chapter provides methodological support for all three research questions (RQ1–RQ3).

Chapter 4: Data analysis

This chapter presents the findings of the empirical research. It is organised according to the five halal certification categories and integrates both qualitative data from the in-depth interviews and quantitative data from the internet questionnaire.

The analysis explores stakeholder interpretations, implementation challenges, and practical requirements. The results offer insights into regulatory uncertainties (RQ1), strategic constraints (RQ2), and actionable opportunities (RQ3). A synthesis section compares and connects both data sets to derive cross-cutting conclusions.

Chapter 5: Discussion of the results

This chapter links the empirical findings back to the research questions. It offers a triangulated discussion of the data, interprets the main insights, and contextualises them within broader academic and policy debates.

The chapter introduces a structured halal implementation guideline tailored to the German chemical-pharmaceutical sector. Strategic considerations, the business relevance of halal certification, and the role of non-economic factors are also explored.

The proposed five-step framework is structured according to the core certification categories and constitutes the primary response to RQ3.

Chapter 6: Conclusion and outlook

This chapter summarises the key findings and provides answers to the research questions. It outlines the theoretical contributions (RQ1), as well as the practical and policy-relevant implications (RQ2). The final version of the halal implementation guideline is presented,

structured into five steps aligned with the core certification domains and tailored to the operational context of the German chemical-pharmaceutical sector (RQ2).

The chapter concludes with a reflection on the study's limitations, a discussion of its implications for industry and regulation, and specific recommendations for future research and stakeholder engagement.

Chapter 7: Appendix

The appendix contains supplementary materials supporting the research. These include interview guides, the internet questionnaire, coding frameworks, additional tables, and the extended version of the halal checklist.

2 LITERATURE REVIEW

Halal certification has gained increasing importance globally, particularly in consumer-oriented sectors such as cosmetics and pharmaceuticals. This trend is not limited to religious or cultural concerns but also reflects strategic and economic dimensions—especially for producers in non-Muslim countries like Germany.

Halal is no longer viewed solely as a religious marker. It has evolved into a complex, partially regulated system of governance, shaped by sector-specific requirements and varied national interpretations.

Section 2.1 establishes the methodological foundation for the subsequent analysis. It outlines the relevance of halal certification (2.1.1), defines the research aim and objectives (2.1.2), explains the mixed-methods approach (2.1.3), justifies the selection of the five benchmark countries (2.1.4), and situates the research within both academic and practical discourse (2.1.5). This section establishes a structured basis for understanding halal requirements and supports the development of an implementation guideline tailored to the chemical-pharmaceutical sector.

The subsequent sections deepen the thematic focus:

- Section 2.2 explores the religious, cultural, and economic foundations of halal, and examines how these shape Muslim consumer behaviour;
- Section 2.3 analyses the governance structures and regulatory frameworks in five key certification environments: Malaysia, Singapore, Indonesia, Turkey, and the UAE;
- Section 2.4 presents a comparative analysis of halal standards across five internationally recognised certification domains: (1) raw materials and ingredients; (2) logistics and warehousing; (3) manufacturing and processing; (4) audits and documentation; and (5) GMOs and enzymes;
- Section 2.5 consolidates these findings into a structured halal checklist and aligns it with established quality assurance systems;
- Section 2.6 discusses the practical challenges of implementing halal certification in an industrial setting, focusing on technical, operational, and organisational barriers, as well as competing certification logics;
- Section 2.7 outlines the German context, including historical, social, and economic factors such as Muslim population trends, market potential, and the relevance of the chemical-pharmaceutical sector;

- Section 2.8 examines current and anticipated halal demand, drawing on both global and domestic market data and demographic projections;
- Section 2.9 explores strategic approaches to embedding halal into corporate structures, looking at internal alignment, external pressures, and long-term positioning; and
- Section 2.10 offers a synthesis of the key findings and defines the research gaps that form the empirical foundation for the following chapters.

2.1 Methodical Approach to the Analysis of Halal Certification

2.1.1 Significance of Halal Certification: Religious, Cultural, and Economic Views

Halal certification has gained increasing global relevance, particularly in health-related sectors such as cosmetics and pharmaceuticals (Ropiah, 2016; Akram, 2022). Its significance can be understood through three interlinked perspectives: religious, cultural, and economic (Mukherjee, 2014; Najmaei *et al.*, 2017; Dinar Standard, 2023).

From a religious standpoint, halal certification confirms that a product complies with Islamic principles—primarily those derived from the Quran. For Muslim consumers, especially in product areas like pharmaceuticals and cosmetics, certification provides assurance that no prohibited (haram) substances are present and that both ethical and spiritual requirements are met (Canavari, Pignatti and Spadoni, 2006).

Culturally, halal serves not only as a religious mandate but also as an expression of identity. In many Muslim-majority societies, halal strongly shapes consumer behaviour, brand perception, and loyalty (Najmaei *et al.*, 2017). Certification can therefore directly influence purchasing decisions, trust, and brand attachment (Miftahuddin *et al.*, 2022).

From an economic perspective, the halal market is among the fastest growing global consumer segments. This growth is driven by rising purchasing power and demographic expansion within Muslim populations (Pew Research Center, 2021; Dinar Standard, 2023). Even where products are not explicitly certified, spending on pharmaceuticals and cosmetics by Muslim consumers is increasing. In 2022, global spending on halal-relevant cosmetics was estimated at USD 84 billion and is projected to reach USD 129 billion by 2027 (CAGR: 8.9%). For pharmaceuticals, the figure stood at USD 108 billion in 2022 and is expected to grow to USD 142 billion by 2027 (CAGR: 5.7%) (Dinar Standard, 2023).

Beyond its ethical function, halal certification is increasingly required for international market access. In regions such as Southeast Asia, the Middle East, and parts of Africa, certification is not only a strategic advantage but often a legal prerequisite. For German companies, this adds a

regulatory layer that affects their export operations and global competitiveness (Evans and Syed, 2015; Kamaruddin *et al.*, 2016).

2.1.2 Methodology: Data-driven Approach Based on International Halal Certification Standards

This study adopts a comparative, data-driven approach to examine halal certification systems in five selected countries and to derive a structured halal checklist for industrial application. The countries—Malaysia, Singapore, Indonesia, Turkey, and the United Arab Emirates—were selected based on their recognised leadership in regulatory design, institutional robustness, and consistently high rankings in the Global Islamic Economy Indicator (GIEI).

To ensure analytical clarity, the study adopts five internationally recognised certification categories: (1) raw materials and ingredients, (2) logistics and warehousing, (3) manufacturing and processing, (4) audits and documentation, and (5) GMOs and enzymes.

Halal assurance must cover the full value chain—not just the final product. Similar to HACCP systems, halal certification is structured around critical control points (Tieman and Ghazali, 2014; Zulfakar, Anuar and Talib, 2014; Kamaruddin *et al.*, 2016). Each of the five categories represents a key control point:

1. Raw materials and ingredients: This forms the starting point of the halal value chain. Certification begins with assessing the source of each component in a chemical-pharmaceutical formulation—whether animal-, vegetable-, petrochemical-, or biotech-based.
2. Logistics and warehousing: Halal integrity can be compromised by cross-contamination with haram products or services. As such, logistics, storage, and distribution have become increasingly important in halal audits.
3. Manufacturing and processing: Production processes have a direct impact on halal status and require control.
4. Audits and documentation: Halal certification requires traceable documentation and regular audit procedures to ensure consistent compliance.
5. GMOs and enzymes: Biotechnologically produced ingredients and enzymes are common in manufacturing. Their halal status depends on the permissibility of the source material, making them a complex but essential audit category.

Aspects such as marketing or religious communication, while important for consumer perception, are not independently auditable and are therefore excluded from this category structure.

Table 2.1 summarises the main halal standards and regulatory frameworks implemented in the five benchmark countries, providing the structural framework for category comparison.

Table 2-1: Overview of the key halal standards and regulatory frameworks in the five countries analyse

Category / Standards & Frameworks	Malaysia	Singapore	Indonesia	Turkey	UAE
Raw Materials & Ingredients	MS 1500, MS 2424, HAS 23201, MS 2200-2, MPPHM	MUIS-HC-S001, HalMQ („Ingredient Control"), PRO Scheme	HAS 23000:1 – Halal Assurance System Criteria; HAS 23201 – Ingredient Evaluation Guidelines	OIC/SMIIC 1:2019; HAS 23103 (ref.); MS 1500:2009 (ref.); restrictions on ethanol and petrochemicals	UAE.S 2055-1:2016; GSO 2055-1:2015; MS 1500:2019 (ref.); UAE Cabinet Resolution No. 10/2014
Logistics & Warehousing	MS 2400 series, GSO 2055-1	MUIS-HC-S001, HalMQ („Storage, Display & Service"), SF Scheme	HAS 23000:1 – Halal Distribution Requirements HAS 23103 – Distribution and Storage Guidelines	GSO 2055-1:2015; MS 2400 Series (ref.); OIC/SMIIC 1:2019	MS 2400 Series (ref.); GSO 2055-1:2015; GSO 9:2013
Manufacturing & Processing	MS 1500, MS 2424, MS 2565, MPPHM, SMIIC 1:2011	MUIS-HC-S001, HalMQ („Machinery", „Cleanliness"), WP & FPA Scheme	HAS 23000:1 – Processing Requirements HAS 23101 – Slaughterhouse Guidelines	OIC/SMIIC 1:2019; MS 2565:2014 (ref.); mandatory samak cleansing in shared facilities	MS 2565:2014; GSO 2055-1:2015; GSO 21:2013; GSO 713:2013; UAE.S 993:2022; GSO 993:2015
Audits & Documentation	MPPHM, HAS, ISO 17065, ISO 19011, MS 1900	MUIS-HC-S002, HalMQ („Documentation", „Internal Halal Committee")	HAS 23000:1 – Halal Control System (HCS) HAS 23000:2 – Certification Process BPJPH Regulation No. 26/2019	OIC/SMIIC 2:2019; ISO 17065:2012; ISO 19011:2011; Halal Assurance System (HAS)	ISO/IEC 17065:2012; ISO 19011:2011; GSO 2055-2:2021; UAE Cabinet Resolution No. 10/2014; Halal Assurance System (HAS)
GMOs & Enzymes	MS 2424, HAS 23201, GSO 2055-1, SMIIC 1:2011	MUIS-HC-S001, HalMQ („Ingredient Control"), PRO Scheme	LPPOM MUI Guidelines; BPJPH Technical Directives	OIC/SMIIC 1:2019; OIC/SMIIC 24:2020; traceability & non-haram origin mandatory	GSO 2055-1:2015; MS 2424:2012

As mentioned above, although additional sector-specific regulations (e.g., for cosmetics) exist, they are not treated separately in this study because they are already embedded in foundational frameworks such as MS 2424, HAS 23000, or OIC/SMIIC 1. Supplementary requirements like labelling and cleaning are further codified in national manuals (e.g., MPPHM, HalMQ, HAS 23000), ensuring sectoral nuances are operationalised within comprehensive certification systems.

An additional comparative metric is the Global Islamic Economy Indicator (GIEI), which benchmarks countries based on halal market size, regulatory systems, and export capabilities (Dinar Standard, 2020, 2021, 2022, 2023). The GIEI supports both country selection and contextual analysis by positioning each case within global halal trade dynamics. Combined with qualitative regulatory insight, this approach ensures a multidimensional understanding of the institutional and economic role of halal certification.

2.1.3 Presentation of the Task and Research Objective

The aim of this study is to systematically analyse the religious, cultural, and regulatory foundations of halal certification in the chemical-pharmaceutical sector and to derive practical, sector-specific recommendations for companies operating in Germany. As the global halal

market expands, producers face growing regulatory complexity—yet also increasing economic opportunity (Wilson and Liu, 2011; Dinar Standard, 2023).

To date, halal certification in Germany has hardly been approached in a strategic or structured way. Practical guidance tailored to industrial implementation remains insufficient, particularly in technically demanding sectors such as chemicals and pharmaceuticals (Tieman, 2015).

This study addresses the gap by integrating three knowledge domains:

- Religious and cultural contextualisation;
- Comparative analysis of certification systems and standards; and
- Operational implementation guidance.

The rationale for this approach is based on four interconnected factors, each reflecting a key driver for halal certification in this sector:

- Cultural change: ethical and religious consumption patterns are gaining importance (Evans and Syed, 2015; Hassan and Harun, 2018);
- Research gap: the halal dimension of the chemical-pharmaceutical industry has been under-researched (Kadir *et al.*, 2016; Kamaruddin *et al.*, 2016);
- Economic opportunity: access to halal markets is often hindered by limited knowledge and inconsistent implementation (Jafari, 2012; Akram, 2022; Dinar Standard, 2022, 2023); and
- Regulatory trend: increasing certification demands call for structured and anticipatory preparation (Hassan and Harun, 2018; Dinar Standard, 2022, 2023).

These aspects are closely linked and influence each other. Cultural expectations shape regulatory standards, whereas the realisation of economic opportunities depends on strategic and operational competencies. To address these dynamics, a mixed-methods approach was applied, combining qualitative and quantitative data sources (Cresswell and Plano Clark, 2018). The research integrates a structured literature review, in-depth interviews, and an internet questionnaire to explore halal certification in both conceptual and practical dimensions. This triangulated design ensures theoretical depth, empirical robustness, and industry relevance.

2.1.4 Justification for the Selection of the Countries

To develop a robust halal checklist, this study analyses the certification systems of five countries that are internationally recognised for their regulatory rigour and influence in global halal governance: Malaysia, Singapore, Indonesia, Turkey, and the UAE. These countries were selected not only due to their high performance in the Global Islamic Economy Indicator (GIEI)

but also based on qualitative criteria such as institutional strength, legal enforceability, and relevance for industrial implementation.

The selection of countries was based on the following criteria:

- Strong performance in GIEI benchmarking, indicating regulatory maturity and market relevance;
- Recognised halal authorities with global standing: JAKIM (Malaysia), MUIS (Singapore), BPJPH (Indonesia), HAK (Turkey), and ESMA (UAE);
- Legal enforceability of halal certification systems and their integration into national regulatory frameworks;
- Strategic role in global halal trade, including logistics, standard-setting, and policy influence; and
- Documented best-practice implementation in export-driven industries, including chemical and pharmaceutical sector.

Each country contributes an individual profile to the international halal landscape. Malaysia stands out for its institutional innovation; Indonesia is home to the world's largest Muslim population; Singapore and the UAE act as logistics and re-export hubs; and Turkey bridges Europe and the Middle East while maintaining alignment with OIC/SMIIC norms. Together, these countries offer regulatory, geographical, and cultural diversity, which is critical for comprehensive analysis (Mukherjee, 2014; Zailani *et al.*, 2015; Khan and Haleem, 2016; HDC, 2020).

Additional countries were considered but ultimately excluded to maintain analytical coherence. The convergence of standards among the selected five allowed for depth without redundancy (Tieman and Ghazali, 2014; Dinar Standard, 2023).

2.1.5 Scientific Foundation and Benefit for Companies

This research is grounded in a comparative, data-informed, and practice-oriented design. It draws on established academic frameworks related to religious law (Wilson and Liu, 2010), certification governance (Hassan and Harun, 2018), and market strategy in the Islamic economy (Zailani *et al.*, 2015; Dinar Standard, 2023).

The comparative assessment of halal certification standards across the five benchmark countries (see Subsection 2.1.4) follows international best-practice principles in regulatory and market analysis (Evans and Syed, 2015; Kamaruddin *et al.*, 2016). The GIEI is used as an external reference to align institutional capacity with economic relevance (Subsection 2.9.2).

Primary data (Chapter 4) were collected via in-depth interviews and an internet questionnaire, following a triangulated design (Cresswell and Plano Clark, 2018). This is particularly suitable for capturing the complexity and embedded nature of halal as a regulatory and cultural system.

For companies in the chemical-pharmaceutical sector, this approach provides the following benefits:

- Clarity on regulatory expectations;
- Strategic orientation for market entry and positioning;
- Reduced compliance risk through standardised guidance; and
- Operational support in preparing for certification audits.

In summary, this research links academic analysis with business practice. It lays the groundwork for companies to respond proactively and competitively to the growing importance of halal in international markets.

2.2 Halal Background

This section examines the religious foundations, sociopolitical embeddedness, and economic perceptions of halal. The aim is to offer a conceptual understanding of halal as both a religious norm and a market signal within Muslim societies.

2.2.1 Halal as Timeless Principle

Religion plays a central role in shaping moral frameworks, which form the foundation of ethical norms and influence both personal and societal behaviour. As noted by Emerson and McKinney (2010), religion provides orientation and meaning, helping individuals navigate questions of identity, purpose, and belonging. Steenblock (2003, p. 165) describes religion as:

> *"… a universal phenomenon, it covers a wider spectrum of dimensions and functions that need to be kept in mind for what follows."*

This central role is further emphasised by von Stosch (2003, p. 103) who observes:

> *"More and more people are using religious techniques to form their identity and are incorporating one or another religious belief into their world view."*

While definitions of religion vary generally, and a universally applicable definition remains intangible (Koch and Held, 2007), its social and ethical significance is widely acknowledged. Within this broader framework, halal, a core concept in Islam, emerges not merely as a religious term but as a norm with spiritual, cultural, and increasingly economic relevance.

The word halal, of Arabic origin, means “permissible” or “lawful” and refers to practices and products that are compliant with Islamic law (sharia). Islam, the second-largest religion in the world, accounting for around 25% of the global population in 2020 (Pew Research Center, 2021; United Nations, 2023a), is based on the teachings of the Prophet Muhammad and was established in the 7th century AD. Islamic law is derived primarily from two sources: the Quran and the Sunnah (traditions of the Prophet).

Sharia—translated as “the path to the watering hole” (Rohe, 2009)—provides a comprehensive framework that regulates all aspects of life, from ritual practice to financial transactions. Importantly, Sharia is not viewed as a fixed legal code, but rather as a method of interpreting divine will in everyday life.

In Islamic jurisprudence, human actions are classified into five categories, of which “halal” (permissible) is one:

1. Obligatory (fard) – actions that are required and whose omission is punishable;
2. Recommended (mandūb, mustahab or sunna) – actions that are encouraged and rewarded, but not mandatory;
3. Permissible (halāl or mubāh) – actions that are religiously neutral and allowed;
4. Reprehensible or disliked (makrūh) – actions that are discouraged but not sinful; and
5. Forbidden (harām) – actions that are explicitly prohibited and punishable.

The concept of halal is therefore part of a moral and legal system that is both normative and spiritual. Muslims do not see halal as a restriction, but rather as a guide for living in accordance with divine principles. Rohe (2009) argues that halal is better understood as an identity-forming principle—a way of life that reflects purity, trustworthiness, and integrity. This perspective is reflected in the strong consumer preference for halal-certified products, especially in sectors perceived as ethically sensitive, such as pharmaceuticals and cosmetics. In these sectors, halal not only ensures compliance with religious law but also affirms ethical production, traceability, and consumer trust.

From this point of view, halal is more than a regulatory label. It is a symbol of religious conviction and cultural continuity. For Muslim consumers, consuming halal-certified products is often linked to spiritual fulfilment and a sense of closeness to God. Halal thus embodies more than legal compliance; it represents a form of ethical consumption that aligns personal values with daily practices.

In the context of this dissertation, this has straight implications for the chemical-pharmaceutical sector. As global demand for halal-compliant products rises, companies must engage with halal not just as a certification process, but as a value system embedded in the lives of their target consumers. For German manufacturers, this means understanding halal as both a spiritual imperative and a potential differentiator in a competitive global market.

In summary, halal is best understood as a holistic principle that integrates law, faith, and consumer ethics. Recognising this depth is essential for companies seeking to meet both regulatory requirements and cultural expectations in Muslim-majority as well as Muslim-minority market.

2.2.2 Private and Political-Social Life in the Context of Religion

From a general perspective, Christianity tends to adopt an autonomous stance in economic matters. Both economists and Christian theologians often emphasise the separation between religion and economics. As a result, Steenblock (2003) argues that the influence of Christian institutions in economic contexts has declined, reinforcing a divide between spiritual and material spheres.

Sung (2011, p. 483) notes:

> *"This sharp division confines religion, particularly Christian churches in this context, to a very restricted role within society, as the majority of social issues are predominantly related to economics."*

In contrast, Islam, especially in Muslim-majority societies, follows a more integrated approach, linking religion with economic, political, and social life. As shown by Haan and Mozammel (2016), Islam functions as both a belief system and a cultural force that significantly shapes consumer behaviour, including in relation to halal certification. Studies confirm that religious norms not only influence personal decisions but also institutional frameworks and public policy (Sung, 2011; Hejase, Hamdar and Raslan, 2013; Said *et al.*, 2013; Mukherjee, 2014; Evans and Syed, 2015; Ismail *et al.*, 2016; Kadir *et al.*, 2016; Mozammel and Haan, 2016; White *et al.*, 2018; Akram, 2022; Dinar Standard, 2022).

Elger (2001) describes Islam as a comprehensive cultural system that goes beyond individual belief to shape laws, politics, and economics. Within this context, Islamic law (sharia) does not separate religious and secular spheres. For instance, the prohibition of interest (riba), discussed by Küng (2004), reflects a broader ethical objective: to avoid economic inequality and ensure

social unity. The goal is not to limit trade but to promote justice and modest consumption, reducing tensions between rich and poor.

Importantly, this principle of interest prohibition exists in Judaism and Christianity as well, although it has been interpreted differently over time. The Hebrew Bible and New Testament contain similar critiques of overcharging, showing that economic morality is a shared concern across traditions. However, in Islamic contexts, these values are more systematically integrated into formal institutions and everyday practice.

Mukherjee (2014) notes the lack of a single global authority for interpreting halal standards. Instead, halal practices are shaped by decentralised actors such as imams, certification bodies and local communities, resulting in diverse interpretations. This variation can be challenging for manufacturers, especially those operating in global markets.

Cornwell *et al.* (2005) confirm significant differences in the understanding of halal across regions and faiths. Similarly, Evans and Syed (2015) argue that halal is context-dependent and cannot be defined universally at any given time. This complexity requires companies to engage with halal not as a fixed checklist, but as a flexible framework that reflects cultural, religious, and institutional diversity.

A study by Rafiki and Wahab (2014) illustrates how Islamic principles have historically guided commercial behaviour. Following the independence of many Muslim countries after World War II, demand for Sharia-compliant financial services and halal-certified goods increased substantially, driven by both political and economic motives (Asa, 2017; Septiadi *et al.*, 2020; Akram, 2022).

Understanding halal thus requires a broader reflection on culture and values. Bonney (2004) defines culture as a causal factor in human development, while Geldsetzer (2015) echoes this perspective. Hofstede (2011) takes this further, describing culture as:

> " *…the collective programming of the mind that distinguishes members of one group or category of people from others.*"

Culture expresses itself through symbols, rituals, myths, and shared perceptions, shaping how individuals interpret and interact with the world. Hofstede (2002), adds that once culture is established, it tends to remain stable over time. Spencer-Oatey and Franklin (2009) describe it as a set of shared assumptions, values, and behaviours that guide both individual and group action.

However, Opielka (2008) described the relationship between culture and religion, as well as the value conflicts present in modern society, as fundamentally unsettled, suggesting that a uniform definition of culture is not currently feasible. Furthermore, Suchanek, Lin-Hi, and Maier (2024) and Miftahuddin *et al.* (2022) contextualise values as structures of normative expectations that develop through reflective experiences. It is essential to differentiate between values that arise from the function of what is valued for a higher purpose and those representing the purpose itself. Rodenstock and Sevsay-Tegethoff (2018) argue that values offer orientation, but conflicting interpretations can also create social tension.

In sum, culture significantly influences economic decisions. In the case of halal, religious and cultural values are closely linked to regulatory systems and consumer expectations. This has direct implications for industry, particularly for sectors like chemical-pharmaceutical manufacturing, where product integrity and compliance are essential.

For German companies, the halal sector presents a strategic challenge. The lack of harmonised standards, coupled with differing religious interpretations, creates a fragmented landscape (Zaina *et al.*, 2015; Poushter, 2016; Yusuf and Yajid, 2016). As a result, manufacturing companies often struggle to identify which rules apply in which context—and how to meet them in a consistent and credible way.

While private and political-religious factors may not seem central from a business perspective, they are essential for understanding the wider context in which halal certification operates. Companies that recognise these dynamics are better positioned to align with consumer expectations and meet certification standards across different markets.

In conclusion, a thorough understanding of religious, cultural, and value-based frameworks is essential for addressing halal requirements. This contextual awareness enables companies to navigate a complex regulatory environment, ensure compliance, and build trust in Muslim-majority markets.

2.2.3 Perception of Halal and Economic Implications

To understand the perception of halal and its economic implications, it is necessary to explore how religious norms interact with economic behaviour across different cultural and institutional settings. Koch and Held (2007) outline four key perspectives within the economics of religion that help frame this relationship:

1. Religion as an economic factor;
2. Relationship between religion and economics in a cultural-theoretical context;

3. Economic theories as the subject of religious studies; and
4. Economic theories as models of religious studies.

These perspectives illustrate how religious ethics, and economic logic can be interwoven. Depending on the analytical orientation, religion may be examined from either the demand side—emphasising the spiritual needs and preferences of consumers—or the supply side, which focuses on the institutions and structures that provide religion-based goods and services. In both cases, religion often serves as a faith-based economic orientation that influences market dynamics and shapes consumer behaviour.

Among Muslim consumers, awareness of halal has grown significantly—particularly among younger generations, who are more proactive in seeking halal alternatives and more vocal in demanding transparency and certification (Jihan, Hashim and Musa, 2014; Tieman and Ghazali, 2014; Hayat, Kumar and Sazili, 2023). Countries such as Malaysia and Indonesia have played a leading role in promoting halal certification as both a consumer standard and a trade requirement (Septiadi *et al.*, 2020; Maifiah *et al.*, 2022).

Noordin, Laila and Samicho (2014) highlight that halal is increasingly perceived as a quality standard that extends beyond religious compliance. In this context, halal certification is not only administered by religious authorities, but also by semi-public and private organisations. Halal is often embedded in national quality infrastructure. This institutional diversification contributes to the rising credibility and commercial appeal of halal-certified products.

A broad body of research confirms the growing relevance of halal as a market differentiator and ethical benchmark (Wilson and Liu, 2011; Bakar, Sulaiman and Osman, 2014; Mathew, Abdullah and Ismail, 2014; Vendrell-Herrero *et al.*, 2017; Djunaidi *et al.*, 2021; Pratikto *et al.*, 2021; Akram, 2022; Dinar Standard, 2022; Miftahuddin *et al.*, 2022; Subri, Omar and Mamat, 2022). This literature illustrates a dual trend: halal is simultaneously driven by religious principle and by market dynamics, with increasing institutionalisation and standardisation at national and international levels.

While halal is often viewed through a legal or compliance lens, it is equally important to recognise its spiritual and identity-forming dimensions. These symbolic aspects reinforce halal as a form of ethical consumption that aligns with religious teachings and cultural expectations. From an economic standpoint, this has created distinct market segments with clearly defined expectations and growing purchasing power.

In summary, the halal economy cannot be understood in purely economic or regulatory terms. It is shaped by a complex interplay between faith, values, and market structures. As such, halal certification serves both as a tool for promoting trust and quality, and as an entry point into a rapidly expanding global market. For manufacturing companies, a deeper understanding of how halal is perceived and institutionalised is essential for unlocking its full economic potential.

2.3 Halal Governance and Certification Frameworks

This section provides an overview of the regulatory frameworks that shape halal certification, with a focus on the roles of governmental authorities and standardisation bodies. It also examines the legal and institutional mechanisms that support these frameworks. The analysis centres on five countries with the most developed and institutionalised halal systems: Malaysia, Singapore, Indonesia, Turkey, and the United Arab Emirates.

2.3.1 Halal Authorities and Standardisation Organisations

Halal certification is carried out by recognised certification bodies that are formally accredited by national religious institutions or designated regulatory authorities. These bodies are responsible for ensuring that products and processes comply with Islamic principles and meet the requirements set by national and, in some cases, international halal standards.

Table 2.2 below presents a selection of key halal authorities and standardisation bodies in ten countries that have made substantial progress in building their halal certification infrastructure (Dinar Standard, 2023).

Table 2-2: Halal authorities and standardisation organisations (Rutkowski, 2024)

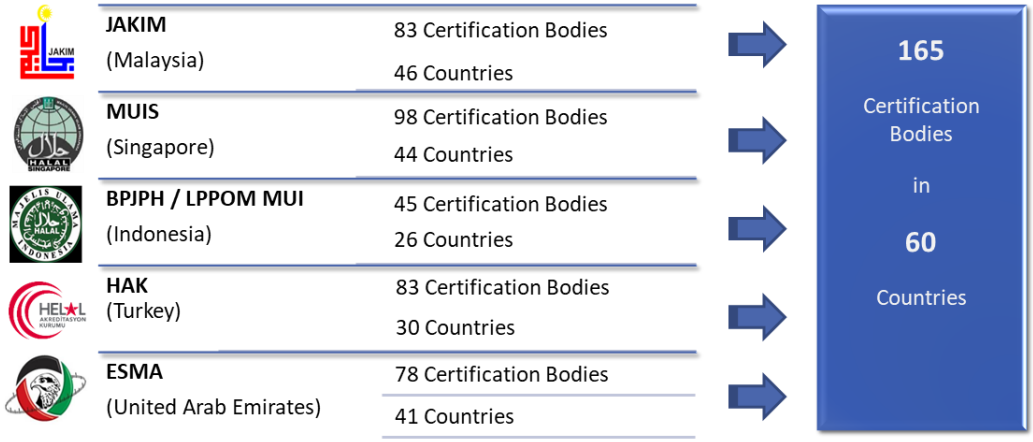
Halal Authority / Standardisation Organisation	Country
Jabatan Kemajuan Islam Malaysia (JAKIM)	**Malaysia**
Majelis Ugama Islam Singapore (MUIS)	**Singapore**
Badan Penyelenggara Jaminan Produk Halal (BPJPH) Majelis Ulama Indonesia (LPPOM MUI)	**Indonesia**
Helal Akreditasyon Kurumu (HAK)	**Turkey**
Emirates Standards & Metrology Authority (ESMA)	**United Arab Emirates**
Egyptian Organization for Standardization & Quality (EOS)	Egypt
Majlis Ugama Islam Brunei (MUIB)	Brunei
Islamic Chamber Research & Information Center (ICRIC)	Iran
Ministry of Islamic Affairs	Maldives
Institut Marocain De Normalisation (IMANOR)	Morocco
Jamea Markaz Uloom Islamia Mansoora (JMUIM)	Pakistan

The five countries highlighted—Malaysia, Singapore, Indonesia, Turkey, and the UAE—maintain the most consistent and stringent halal governance systems. These countries play a leading role in defining international halal standards, not only due to their religious authority but also due to their economic relevance and export orientation. Given the growing commercial interest in the

halal sector, this regulatory landscape is highly dynamic. It is likely that further authorities and frameworks will emerge in the coming years, particularly in non-Muslim majority countries aiming to access halal markets.

In general, certification bodies must be accredited by official halal authorities or by recognised national accreditation institutions. As of 2023, there are 165 approved halal certification bodies operating in over 60 countries worldwide. This reflects the increasing globalisation of halal certification and its strategic importance for cross-border trade.

Figure 2.1 provides a visual overview of the current halal authorities and standardisation bodies.



Overview JAKIM, ESMA, MUIS, BPJPH / LPPOM MUI and TSE / HAK 2023

Figure 2-1: Authorities and standardisation bodies 2023 (Rutkowski, 2024)

It is important to note that the initial focus of halal certification bodies was largely limited to meat, poultry, and processed food products. However, in recent years, their scope has expanded to include other high-sensitivity sectors, such as cosmetics and the chemical-pharmaceutical industry (Azam and Abdullah, 2020; Maifiah *et al.*, 2022; Dinar Standard, 2023).

2.3.2 Influence of Policy and Legislation

The influence of policy and legislation on halal certification is considerable and multifaceted, shaping both the credibility and availability of halal products in domestic and international markets. These legal and policy frameworks are particularly important in countries with significant Muslim populations, but they also affect non-Muslim majority countries engaged in halal export.

The impact of legislation can be observed across several levels, ranging from food safety and public health to trade policy and sociocultural governance (Mohd Yusof and Wan Jusoh, 2014; Salam, 2019). In particular, the legal prohibition of haram substances such as pork and alcohol requires robust and enforceable oversight mechanisms to ensure certification. Regulatory clarity

not only aligns domestic standards but also builds international confidence in certified halal products.

A national legal framework serves as a structural foundation for the consistent and transparent implementation of halal standards. When certification is mandated or overseen by formal institutions, the process gains credibility and becomes less vulnerable to manipulation or fraud. This institutionalisation strengthens public trust, particularly in sensitive product categories such as food, cosmetics, and pharmaceuticals.

In addition to domestic regulation, economic policies and international trade agreements increasingly include halal-specific conditions. These frameworks can facilitate the export of halal products and incentivise investment in certification infrastructure (Evans and Syed, 2015). Government subsidies and technical support, for instance, may encourage businesses to pursue halal certification, foster local job creation, and stimulate sectoral growth. At the same time, protectionist policies or trade barriers may be introduced, either to prioritise domestic producers or to enforce compliance with local halal norms.

From a consumer protection perspective, legal controls help prevent misleading halal claims and uphold hygiene and safety standards. These controls are particularly relevant in industries where consumers rely heavily on certification due to the difficulty of verifying compliance independently.

However, the degree of state involvement in halal governance varies, depending on each country's legal system and its alignment with Islamic principles (Mumuni and Kamarulzaman, 2018). While some countries have codified halal certification into national law, others treat it as a voluntary or market-driven mechanism.

Evans and Syed (2015) underline that there is no uniform solution to the legal challenges associated with halal regulation. Subsequent studies also point to the increasing overlap between commercial, legal, and religious interests in halal governance (Pratikto *et al.*, 2021; Akram, 2022; Subri, Omar and Mamat, 2022). The authority and legitimacy of halal accreditation bodies are directly shaped by national legislation, which defines their mandate, scope, and enforcement capabilities (Septiadi *et al.*, 2020).

Legislation plays a critical role in shaping the halal ecosystem. It defines not only how halal is understood and regulated, but also how it is positioned within broader national policy objectives such as trade development, public health, and ethical governance.

2.3.3 Ideal Halal Certification Process

Halal certification today extends beyond a purely religious function and has evolved into a multilayered, state-influenced regulatory process. While the underlying religious principles remain universal, institutional implementation may vary across countries.

The figure below outlines the ideal structure of a halal certification system, reflecting best practices observed in leading regulatory environments.

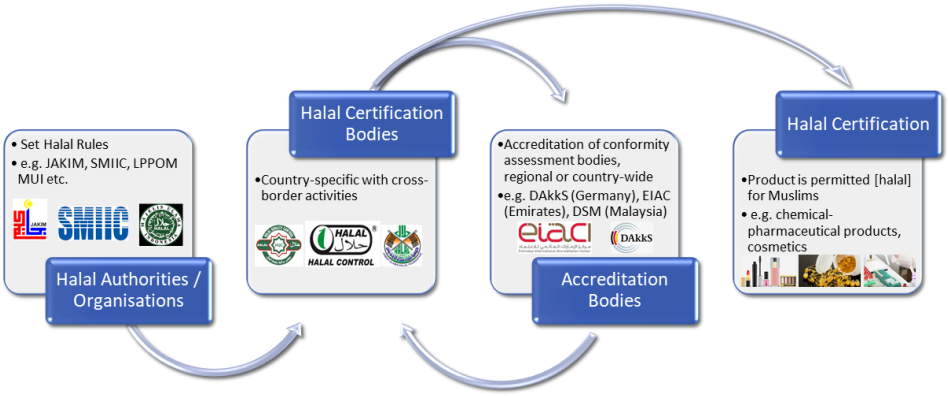


Figure 2-2: Ideal process: From authorities to halal certification (Rutkowski, 2024)

This ideal process incorporates the following key steps:

- Halal standards are developed by recognised religious and technical authorities (e.g. JAKIM, MUIS, LPPOM MUI, ESMA);
- Standardisation organisations (e.g. SMIIC, GSO, ISO) ensure alignment with international frameworks;
- Accreditation bodies review and authorise certification bodies according to defined competency and independence criteria;
- Halal certification bodies implement the standards on the ground, audit supply chains, and issue halal certificates; and
- Ongoing investigation and audit mechanisms help ensure continuous compliance with halal standards, they also enable the renewal or, if needed, the withdrawal of certification.

The process begins with religious and technical authorities defining the requirements, which are subsequently institutionalised through national and international standardisation efforts. Certification bodies operate under the oversight of accreditation agencies, ensuring that their practices are consistent, accountable, and legally recognised.

Authorities such as JAKIM, LPPOM MUI, MUIS, and ESMA, alongside organisations like SMIIC, play a central role in maintaining coherence between religious principles and regulatory frameworks (GIEC, 2021; Dinar Standard, 2023). These bodies provide the structural backbone for halal governance, especially in high-standard jurisdictions.

Countries such as Malaysia, Singapore, Indonesia, Turkey, and the UAE have developed especially rigorous and institutionalised halal ecosystems. Collectively, they represent approximately 400 million people, including around 350 million Muslims—or nearly 20% of the global Muslim population (Pew Research Center, 2021; United Nations, 2023b; Rutkowski, 2024). Consequently, these regulatory approaches are central to the development of global halal trade standards. All in all, the ideal halal certification process is based on collaboration between religious guidance, regulatory institutions, and operational actors.

2.3.4 Status Quo of Halal Certification in Selected Countries

2.3.4.1 Malaysia

Malaysia, with a population of approximately 34 million—of whom around 60% are Muslim—and a GDP of USD 407 billion in 2022 (equivalent to roughly 0.4% of global output), is widely recognised as a pioneer in strategically developing the halal economy (Jais, 2019; Suhaimee, Abdullah and Alias, 2019; Dinar Standard, 2022; Trading Economics, 2023).

Between 2006 and 2010, the Malaysian government launched a coordinated strategy to expand its halal sector. A key milestone during this period was the establishment of the World Halal Forum and the World Halal Research conferences, which helped raise international awareness and foster global stakeholder engagement (Evans and Syed, 2015; Akram, 2022). These initiatives were consolidated under the Halal Industry Master Plan, which aimed to position Malaysia as the leading global halal hub (HDC, 2020).

The central regulatory authority for halal certification is the Department of Islamic Development Malaysia (JAKIM), established in 1997. JAKIM is responsible for halal certification at the federal level, particularly in relation to exports and imports. Domestic halal certification is managed by the Islamic departments of individual states (JAIN). Both levels work together to ensure regulatory coherence across the country (Supriyadi *et al.*, 2024).

A distinctive feature of the Malaysian system is that JAKIM retains exclusive authority to approve all halal certificates, both for national and international use. This centralised process has been described by Aziz *et al.* (2015), Khan and Haleem (2016), and Zaina *et al.* (2015) as a critical factor in maintaining credibility and uniformity. Ongoing coordination between JAKIM and JAIN is

facilitated through regular inter-agency meetings and standardised training, enabling systematic performance monitoring across federal, religious, and state bodies (Suhaimee, Abdullah and Alias, 2019; Zakaria, Musa and Gani, 2019).

JAKIM follows a comprehensive regulatory framework based on Sharia law and detailed national standards, including MS 2424:2012 (halal chemical-pharmaceuticals), HAS 23201 (raw materials), MS 2565:2014 (packaging), MS 2400 (supply chain) and GSO 2055-1:2015 and OIC/SMIIC 1:2011 (GMOs and enzymes). These are reinforced by guidelines in the Manual Procedure for Malaysia Halal Certification (MPPHM, 2020), which detail requirements for raw materials, processing, cleaning, and traceability.

Below is an overview of the Malaysian standards, assigned to the five relevant categories:

Table 2-3: Halal standards by category in Malaysia

Category / Standards & Frameworks	Malaysia
Raw Materials & Ingredients	MS 1500, MS 2424, HAS 23201, MS 2200-2, MPPHM
Logistics & Warehousing	MS 2400 series, GSO 2055-1
Manufacturing & Processing	MS 1500, MS 2424, MS 2565, MPPHM, SMIIC 1:2011
Audits & Documentation	MPPHM, HAS, ISO 17065, ISO 19011, MS 1900
GMOs & Enzymes	MS 2424, HAS 23201, GSO 2055-1, SMIIC 1:2011

In 2023, JAKIM officially approved 83 foreign certifiers from 46 countries, a significant increase from 56 certifiers from 33 countries in 2016. This reflects an upward trend in the number of approved foreign certifiers (JAKIM, 2023; Salama, 2023).

Given its legal clarity, comprehensive scope, and strong international standing, Malaysia's halal system is widely viewed as a global reference model. It offers practical and institutional guidance for other countries seeking access to or legitimacy within the global halal market.

2.3.4.2 Singapore

Singapore, with a population of approximately 6 million, is a relatively small country but exerts a significant influence on halal certification practices across various nations. Around 16% of the population—approximately 1 million individuals—are Muslim. In 2022, Singapore reported a GDP of USD 467 billion (World Bank Group, 2022; The World Bank, 2024).

The Islamic Religious Council of Singapore (MUIS) is the sole authority responsible for halal certification. Established in 1968 as a statutory body under the Ministry of Culture, Community and Youth, MUIS oversees all aspects of halal governance and certification in the country.

The system is built on two core documents:

- MUIS-HC-S001 (General Guidelines); and
- MUIS-HC-S002 (Halal Quality Management System Guidelines).

These documents are operationalised through the Halal Quality Management System (HalMQ), which defines protocols for ingredient control, internal governance, and traceability. HalMQ also mandates the formation of internal halal committees, ensuring that companies establish clear responsibilities for halal certification within their operations.

Biotechnologically sensitive issues such as the use of enzymes and GMOs are governed through separate schemes such as the Product (PRO) and Whole Plant (WP) categories. These schemes apply rigorous requirements regarding source material, purity, and traceability, particularly relevant for the chemical-pharmaceutical and food technology sectors.

The following table shows the categorisation of the standards in Singapore:

Table 2-4: Halal standards by category in Singapore

Category / Standards & Frameworks	Singapore
Raw Materials & Ingredients	MUIS-HC-S001, HalMQ ("Ingredient Control"), PRO Scheme
Logistics & Warehousing	MUIS-HC-S001, HalMQ ("Storage, Display & Service"), SF Scheme
Manufacturing & Processing	MUIS-HC-S001, HalMQ ("Machinery", "Cleanliness"), WP & FPA Scheme
Audits & Documentation	MUIS-HC-S002, HalMQ ("Documentation", "Internal Halal Committee")
GMOs & Enzymes	MUIS-HC-S001, HalMQ ("Ingredient Control"), PRO Scheme

A distinguishing feature of Singapore's system is the stringent and process-oriented nature of HalMQ. It not only establishes minimum compliance thresholds but also promotes continuous quality improvement across procurement, production, storage, and logistics.

As of 2023, MUIS had accredited 98 halal certification bodies across 44 countries (MUIS, 2023). These certifiers must meet strict criteria, including regular surveillance audits and documented compliance with MUIS standards. Their certificates are recognised both domestically and internationally, strengthening Singapore's role as a regional reference point for halal governance. Singapore's halal system is considered well-institutionalised, technically mature, and internationally credible, making it a relevant benchmark for sectors dealing with complex production systems and regulatory environments, such as pharmaceuticals and biotechnology.

2.3.4.3 Indonesia

Indonesia, with a population of approximately 275 million, of whom around 87% (approximately 240 million people) are Muslim, is home to the world's largest Muslim population. In 2022, the country reported a GDP of USD 1,319 billion (World Bank Group, 2022; The World Bank, 2024).

The national halal regulatory system is jointly administered by the Halal Product Assurance Organising Agency (Badan Penyelenggara Jaminan Produk Halal – BPJPH) and the Assessment Institute for Foods, Drugs, and Cosmetics (LPPOM MUI). While BPJPH is responsible for

governance, coordination, and public awareness, LPPOM MUI handles technical evaluations and the issuance of halal certificates.

The system is based on the Halal Assurance System (HAS), with the core requirements defined in HAS 23000:1 and HAS 23201. These standards cover all critical areas of halal compliance, beginning with raw materials and ingredients: only halal-certified and transparently documented substances are permitted. Ingredients derived from haram sources, such as pork or alcohol, are categorically excluded.

The area of logistics and storage is regulated under HAS 23103, which mandates:

- Physical separation of halal and non-halal goods;
- Hygienic storage conditions; and
- Protection from cross-contamination along the entire supply chain.

Production and processing are also highly regulated. HAS 23101 outlines Islamic-compliant slaughtering techniques, while HAS 23000:1 addresses cleaning procedures and the use of shared production equipment. These rules ensure that both manual and mechanised production comply with Islamic principles and hygiene standards.

In the domain of audits and documentation, companies are required to implement a robust Halal Control System (HCS). This includes:

- Detailed Standard Operating Procedures (SOPs);
- Traceability mechanisms; and
- Regular internal and third-party audits to maintain certification status.

The regulation of GMOs and enzymes is equally detailed. Only materials derived from halal-compliant sources are permitted, and all inputs must be fully traceable. These rules are articulated in HAS 23201 and reinforced through technical guidelines from BPJPH and LPPOM MUI.

Table 2-5: Halal standards by category in Indonesia

Category / Standards & Frameworks	Indonesia
Raw Materials & Ingredients	HAS 23000:1 – Halal Assurance System Criteria; HAS 23201 – Ingredient Evaluation Guidelines
Logistics & Warehousing	HAS 23000:1 – Halal Distribution Requirements; HAS 23103 – Distribution and Storage Guidelines
Manufacturing & Processing	HAS 23000:1 – Processing Requirements; HAS 23101 – Slaughterhouse Guidelines
Audits & Documentation	HAS 23000:1 – Halal Control System (HCS); HAS 23000:2 – Certification Process; BPJPH Regulation No. 26/2019
GMOs & Enzymes	LPPOM MUI Guidelines; BPJPH Technical Directives

Indonesia has authorised 45 international halal certifiers from 26 countries (LPPOM MUI, 2023). These certifiers are subject to approval processes that align with Indonesia's institutional standards and religious requirements.

Indonesia's halal ecosystem stands out due to its solid legal foundation, a dual-institutional structure, and a strong emphasis on transparency throughout the value chain. The integration of BPJPH and LPPOM MUI ensures comprehensive regulatory oversight, making Indonesia a key player in the global halal certification landscape.

2.3.4.4 Turkey

Turkey has a population of 85 million, of whom 98% (approximately 84 million) are Muslims. In 2022, the country reported a GDP of USD 907 billion (World Bank Group, 2022; The World Bank, 2024). Turkey's geopolitical position—at the intersection of Europe and Asia—provides unique access to both Muslim-majority markets and Western trading blocs. As a result, halal certification in Turkey plays a strategically important role.

The sole national authority responsible for halal regulation is the Halal Accreditation Agency (HAK), established in 2017 under the Ministry of Trade. HAK's regulatory framework is aligned with international guidelines, particularly those issued by the Organisation of Islamic Cooperation (OIC) and the Standards and Metrology Institute for Islamic Countries (SMIIC).

One of the core regulatory documents is OIC/SMIIC 1:2019 (General Requirements for Halal Food), which sets out requirements for raw materials, processing, logistics, and packaging. It is complemented by OIC/SMIIC 2:2019 (Requirements for Bodies Providing Halal Certification), which outlines operational criteria for certification bodies.

International norms such as ISO 17065:2012 (Conformity Assessment – Requirements for Bodies Certifying Products, Processes and Services) and ISO 19011:2011 (Guidelines for Auditing Management Systems) provide the audit and quality assurance framework integrated by HAK.

Specialised standards, such as OIC/SMIIC 24:2020 (food additives) and MS 2565:2014 (packaging materials), are applied in biotechnology-related areas, including enzyme use and product-contact substances.

For transport and storage, Turkey references internationally accepted standards such as GSO 2055-1 and Malaysia's MS 2400 series.

Taken together, Turkey pursues a harmonised halal certification model through HAK, strongly based on international norms, with particular emphasis on traceability, purity, and robust auditing mechanisms.

The following table provides an overview of the key frameworks in Turkey:

Table 2-6: Halal standards by category in Turkey

Category / Standards & Frameworks	Turkey
Raw Materials & Ingredients	OIC/SMIIC 1:2019; HAS 23103 (ref.); MS 1500:2009 (ref.); restrictions on ethanol and petrochemicals
Logistics & Warehousing	GSO 2055-1:2015; MS 2400 Series (ref.); OIC/SMIIC 1:2019
Manufacturing & Processing	OIC/SMIIC 1:2019; MS 2565:2014 (ref.); mandatory samak cleansing in shared facilities
Audits & Documentation	OIC/SMIIC 2:2019; ISO 17065:2012; ISO 19011:2011; Halal Assurance System (HAS)
GMOs & Enzymes	OIC/SMIIC 1:2019; OIC/SMIIC 24:2020; traceability & non-haram origin mandatory

As of 2024, HAK had accredited 83 certification bodies from 30 countries (HAK, 2024). Turkey's alignment with OIC norms and international standards positions the country as a key actor in globally recognised halal certification.

2.3.4.5 United Arab Emirates

The United Arab Emirates (UAE), with a population of approximately 10 million—around 75% of whom are Muslim—and a GDP of USD 507 billion in 2022, has strategically positioned itself as a global leader in halal standardisation and certification (Statista, 2022; World Bank Group, 2022; Trading Economics, 2023).

In 2014, the UAE formalised its halal strategy to support its ambition of becoming a global halal hub. This included strategic engagement with international stakeholders and trade agreements, most notably with the European Union (EU) and China (EU – UAE Halal Roundtable, 2016; Mogielnicki, 2019).

The central authority responsible for halal standardisation is the Emirates Authority for Standardisation and Metrology (ESMA), which was integrated into the Ministry of Industry and Advanced Technology (MoIAT) in 2022 to enhance regulatory capacity (ESMA, 2020, 2023).

At the core of the UAE's halal framework is UAE.S 2055-1:2016 (Halal Food: General Requirements), which outlines essential requirements for halal products—particularly regarding raw materials, processing, and labelling. This is supplemented by GSO 2055-1 and industry-specific standards such as MS 2565:2014 for packaging and MS 2424:2012 for chemical-pharmaceutical products.

Logistics and storage are governed by particularly strict requirements, including separation and hygiene protocols as defined in the MS 2400 series and GSO regulations. The auditing framework aligns with international standards: certification bodies must be accredited according to ISO/IEC 17065:2012 (Conformity Assessment – Requirements for Bodies Certifying Products, Processes and Services) and ISO 19011:2011 (Guidelines for Auditing Management Systems).

Compliance is further ensured through a mandatory Halal Assurance System (HAS). Additional national regulations apply, including UAE.S 993:2022 for slaughtering practices and UAE.S 2055-4:2014 for halal cosmetics. A central quality label, the Halal National Mark, serves as a widely recognised symbol of halal conformity.

Taken together, the UAE's halal system offers a legally grounded, integrated, and internationally harmonised framework for the production, certification, and global market access of halal-compliant products.

The following table provides an overview of the key frameworks in the UAE:

Table 2-7: Halal standards by category in UAE

Category / Standards & Frameworks	United Arab Emirates
Raw Materials & Ingredients	UAE.S 2055-1:2016; GSO 2055-1:2015; MS 1500:2019 (ref.); UAE Cabinet Resolution No. 10/2014
Logistics & Warehousing	MS 2400 Series (ref.); GSO 2055-1:2015; GSO 9:2013
Manufacturing & Processing	MS 2565:2014; GSO 2055-1:2015; GSO 21:2013; GSO 713:2013; UAE.S 993:2022; GSO 993:2015
Audits & Documentation	ISO/IEC 17065:2012; ISO 19011:2011; GSO 2055-2:2021; UAE Cabinet Resolution No. 10/2014; Halal Assurance System (HAS)
GMOs & Enzymes	GSO 2055-1:2015; MS 2424:2012

As of 2023, ESMA had officially authorised 78 certification bodies from 41 countries (ESMA, 2023).

The UAE's halal framework stands out for its combination of regulatory rigour and international trade diplomacy. Its close alignment with global standards and emphasis on traceability across the value chain position the UAE as a key reference point for international halal stakeholders.

2.4 Comparative Analysis of Halal Certification Requirements

This section presents a structured comparative analysis of halal certification requirements across five countries with the most stringent and influential regulatory frameworks (Azam and Abdullah, 2020; Dinar Standard, 2023). The comparison is organised according to five internationally recognised categories: (1) raw materials and ingredients, (2) logistics and warehousing, (3) manufacturing and processing, (4) audits and documentation, and (5) GMOs

and enzymes. For each category, regulatory documents and best practices are examined to identify the highest prevailing standards.

2.4.1 Raw Materials and Ingredients

The selection, origin, and composition of raw materials are central to halal certification, where animal-derived substances, alcohol-based compounds, or biotechnologically produced ingredients are frequently used.

To allow for a detailed assessment, the category Raw Materials and Ingredients is divided into seven subcategories, enabling differentiated analysis and the derivation of practical, checklist-compatible criteria:

a. Animal-based (aquatic);
b. Animal-based (terrestrial/predators);
c. Ethanol in formulation;
d. Petrochemical substances;
e. Slaughter (animals);
f. Slaughter (tools); and
g. Vegetable-based materials.

The analysis focuses on commonly used chemical-pharmaceutical ingredients, including animal-derived gelatine, petrochemical derivatives (e.g. ethylene oxide based goods), and fermentation-derived enzymes. For instance, aquatic animals such as tuna or crab are generally considered halal, provided they are free from harmful toxins. In contrast, pigs and predatory animals are categorically haram; their derivatives (e.g. gelatine, lipids) must therefore be strictly avoided.

Ethanol presents a particularly sensitive issue. Regulatory frameworks differentiate between products with indication ethanol residues and those where ethanol is removed during processing. Petrochemical substances derived from gas or oil may be considered halal if specific conditions are met. Slaughter regulations, including the use of sharp tools and the avoidance of death by stunning, are especially relevant for animal-derived ingredients. Vegetable-based raw materials (e.g. coconut oil, dextrose) are generally halal, provided they are not cross-contaminated with haram substances.

Standards compared:

- Malaysia: MS 1500:2009, MS 2424:2012, HAS 23201, MPPHM, MS 2200-2:2012;
- Singapore: MUIS-HC-S001, HalMQ;

- Indonesia: HAS 23000:1, HAS 23201;
- Turkey: OIC/SMIIC 1:2019, HAS 23103, MS 1500:2009; and
- UAE: UAE.S 2055-1:2016, GSO 2055-1:2015, MS 1500:2019, UAE Cabinet Resolution No. 10/2014.

Country specific insights:

- Malaysia applies a comprehensive and modular system based on MS 2424:2012 and HAS 23201, offering detailed guidance for ingredients and animal by-products. A key strength lies in the integration of religious criteria with scientific traceability mechanisms. The framework allows flexible application across product types, with clearly defined ethanol thresholds and checklists for common inputs such as gelatine and enzymes;
- Singapore follows a strict documentation regime through MUIS-HC-S001 and HalMQ, requiring ingredient-level approval. While this ensures high compliance and consumer trust, it can delay approval for complex or novel formulations. The system is highly product-centric, with limited tolerance for technically essential excipients such as ethanol;
- Indonesia enforces full traceability and prohibits all haram components. Guidelines such as HAS 23000:1 and HAS 23201 offer structured and prescriptive rules, particularly on vegetable-based inputs and animal-derived substances. The result is a very high compliance level, though the regulatory burden on manufacturers is considerable;
- Turkey promotes international alignment, especially through OIC/SMIIC 1. It allows the use of petrochemical inputs under controlled conditions and supports an export-oriented, relatively flexible approach. However, interpretation by certifiers may vary, particularly in areas such as fermentation and ethanol-containing substances; and
- The United Arab Emirates operates a codified legal model based on UAE.S 2055-1:2016 and Cabinet Resolution No. 10/2014. This offers high legal certainty, though it may slow the approval of new formulations. The framework is especially clear in defining rules for cosmetic actives and animal-based excipients, contributing to a high level of product assurance.

The following matrix outlines the strictest country-specific requirements, key regulatory priorities, and implementation criteria:

Table 2-8: Strictest halal requirements for raw materials and ingredients

Category	No	Area	Strongest Halal-Requirements
Raw Materials & Ingredients	a	Animal-based (aquatic animals)	Only non-toxic species, halal-compliant documentation (Malaysia)
	b	Land animals / predators	Exclusion of all haram species, only materials from halal-slaughtered animals (Indonesia)
	c	Ethanol in the recipe	Limit ≤ 0.5%, technically necessary, fully evaporated (Malaysia)
	d	Petrochemical raw materials	Permitted with documented purity, no alcohol contact (Malaysia/UAE)
	e	Slaughter (animals)	State-recognised method, certified and documented (Indonesia/UAE)
	f	Slaughter (tools)	Only sharp, approved tools, documented application (Malaysia)
	g	Vegetable-based	Generally permitted, but origin and storage must be documented (Singapore)

2.4.2 Logistics and Warehousing

This category focuses on logistics processes from storage and transportation to final distribution of the goods. A consistent requirement across all national frameworks is the physical and procedural separation of halal and non-halal products to prevent contamination. The international comparison shows how standards for labelling, storage conditions, and traceability are defined and enforced. These requirements are gaining importance as global supply chains become increasingly complex and interconnected.

The relevant halal compliance aspects are:

- Product filling and loading (h): Use of dedicated lines with documented cleaning procedures between product changes;
- Product storage (i): Separate storage of halal-compliant finished goods with full traceability;
- Product transport (j): Halal-compliant transportation routes or documented cleaning and segregation in mixed logistics;
- Raw material procurement (k): Certified suppliers with proof of halal compliance across production and supply chains; and
- Raw material storage (l): Segregated storage areas with no cross-contamination, under controlled environmental conditions.

Standards compared:

- Malaysia: MS 2400 Series;
- Singapore: MUIS-HC-S001, HalMQ;
- Indonesia: HAS 23000:1, HAS 23103;
- Turkey: GSO 2055-1, MS 2400 Series, OIC/SMIIC 1:2019; and

- UAE: MS 2400 Series, GSO 2055-1, GSO 9:2013.

Country specific insights:

- Malaysia provides a comprehensive logistics framework via the MS 2400 series, which covers the full logistics chain—from inbound transport to retail distribution. The system's detailed segregation measures between halal and non-halal goods are widely considered best practice, making Malaysia a reference point for other regulatory systems;
- Singapore places particular emphasis on contamination prevention and packaging integrity. The combination of MUIS-HC-S001 and HalMQ ensures high traceability and robust internal procedures. However, this high level of assurance often requires significant infrastructure investment, and the country's labelling rules are among the most stringent globally;
- Indonesia defines mandatory storage protocols and detailed logistical control points. The combined application of HAS 23000:1 and HAS 23103 provides a structured but resource-intensive framework. Specific requirements for interim storage and temperature control further reflect the depth of the system's oversight;
- Turkey aligns with international guidelines (e.g. GSO, SMIIC), promoting global compatibility. While the inclusion of the MS 2400 series adds value, the national implementation of storage and transport standards lacks uniformity, partly due to limited implementation infrastructure; and
- United Arab Emirates incorporates logistics provisions through GSO and national standards, forming a coherent but occasionally rigid structure. GSO 9:2013 reinforces labelling requirements, although the administrative complexity of the system may challenge exporters. Implementation is legally binding, yet can require substantial operational resources.

The following table on logistics and warehousing outlines country-specific requirements across five key halal-relevant logistics categories. It highlights regulatory priorities and implementation criteria.

Table 2-9: Strictest halal requirements for logistics and warehousing

Category	No	Area	Strongest Halal-Requirements
Logistics & Warehousing	h	Product filling and loading	Separate production lines or documented cleaning procedures (Malaysia)
	i	Product storage	Physical separation, climate control (Malaysia/Indonesia)
	j	Product transport	Documented segregation, transport seals, halal logistics (UAE)
	k	Raw material procurement	Only certified suppliers, traceability required (Malaysia)
	l	Raw material storage	Separate storage zones or documented cleaning cycles (Singapore)

An example of halal-compliant logistics is the exclusive use of warehouses that hold halal certification. In contrast, storing halal-compliant and alcohol-containing haram products on shared shelving can create ambiguity and significantly increase the risk of losing halal certification.

2.4.3 Manufacturing and Processing

Manufacturing and processing constitute key control points within the halal certification process. This is especially relevant in the chemical and pharmaceutical sector, where the potential for contamination with haram substances such as alcohol residues or animal-derived fats requires the implementation of technically sound and verifiable safeguards.

Standards compared:

- Malaysia: MS 1500:2009, MS 2424:2012, MS 2565:2014, OIC/SMIIC 1;
- Singapore: MUIS-HC-S001, HalMQ, WP Scheme;
- Indonesia: HAS 23000:1, HAS 23101;
- Turkey: OIC/SMIIC 1, MS 2565; and
- UAE: MS 2565, GSO 2055-1, GSO 21:2013, GSO 713:2013, UAE.S 993:2022.

Country-specific analysis:

- Malaysia offers detailed technical guidelines for production, particularly through MS 2424:2012, which includes protocols for cleanroom conditions and equipment validation. Ethanol may be used, provided no traceable residue remains in the final product. The standards are operationally structured and comprehensive, though compliance may require complex internal coordination;
- Singapore mandates whole-plant certification via the WP Scheme, ensuring a high level of process control. While this strengthens consumer confidence, it raises entry barriers for manufacturers. Strict limitations apply to ethanol during critical production stages.

In addition, the HalMQ framework mandates an internal halal committee, responsible for implementation and compliance;

- Indonesia requires ritual purification if contamination with haram substances is suspected. This adds significant technical and organisational effort. HAS 23101 specifies equipment-level certification and rigorous traceability, making the Indonesian system one of the most demanding globally, particularly regarding equipment reuse and batch-level documentation;
- Turkey applies international halal standards (e.g. OIC/SMIIC 1), which require the cleaning of shared production lines to maintain halal integrity. This provides regulatory clarity; however, adapting existing production facilities to meet these requirements can be challenging in practice. While packaging and cleansing requirements are clearly defined, sector-specific regulations for pharmaceutical manufacturing are not yet consistently applied at the national level; and
- UAE integrates national and regional standards, with a strong focus on packaging, excipient control, and traceability. GSO 2055-1 mandates audits of all packaging components, and UAE.S 993:2022 defines which excipients are halal compliant. The framework provides legal certainty, but the level of documentation required for compliance is significant.

A common example is the separation of production lines for alcohol-containing and alcohol-free formulations. Packaging must be conducted under controlled conditions using materials that are free from animal-derived or alcohol-based residues. Equipment previously used with non-halal substances must undergo ritual cleansing. Further critical control areas include airflow systems, circulation of auxiliary substances, and shared energy infrastructure.

The following table (categories m–p) provides a comparative overview of the strictest requirements in manufacturing, facilities, packaging, and ethanol usage across the five benchmark countries.

Table 2-10: Strictest halal requirements for manufacturing and processing

Category	No	Area	Strongest Halal-Requirements
Manufacturing & Processing	m	Ethanol in the process	Permitted if technically necessary and fully evaporated (Malaysia)
	n	Product manufacture	Samak cleansing, separate facilities, airflow control (Singapore)
	o	Product packaging	Only certified materials, no animal or alcohol contact (UAE)
	p	Product plants	Audited infrastructure, samak if required, halal zones (Indonesia)

2.4.4 Audits and Documentation

This subsection analyses the implementation of halal quality management systems, focusing on two key areas: (r) audit practices (internal and external) and (s) documentation of processes and work instructions. In the chemical-pharmaceutical sector, traceability, standardised operating procedures (SOPs), and regular audit cycles are especially critical, as regulatory bodies require demonstrable and ongoing halal compliance.

A good practice example is companies that conduct a comprehensive halal audit on an annual basis, covering supplier chains, raw material sources, and packaging partners. Digitally managed documentation systems with secure version control and clearly defined user access are widely regarded as best practice. In contrast, insufficient audit continuity or poor documentation integrity can lead to certification risks and product nonconformities.

Standards compared:

- Malaysia: MPPHM, HAS, ISO 17065, ISO 19011, MS 1900;
- Singapore: MUIS-HC-S002, HalMQ;
- Indonesia: HAS 23000:1, HAS 23000:2, BPJPH Regulation No. 26/2019;
- Turkey: OIC/SMIIC 2, ISO 17065, ISO 19011, HAS; and
- UAE: ISO/IEC 17065, ISO 19011, GSO 2055-2:2021, UAE Cabinet Resolution No. 10/2014, HAS.

Country-specific insights:

- Malaysia integrates religious and technical quality standards through ISO 17065 and ISO 19011. The MPPHM provides an audit framework, covering supplier verification, internal inspections, and end-to-end documentation. With MS 1900, Malaysia has become one of the first countries to link shariah-compliant principles to formal quality management systems, combining Islamic ethics with operational effectiveness;
- Singapore, under MUIS-HC-S002, requires certified companies to form an internal halal committee responsible for continuous compliance oversight. This committee conducts regular risk-based assessments, forming the core of a self-governing Quality Management System (QMS) within the HalMQ model. While this structure supports autonomy and internal control, it requires strong governance and staff with specific halal training;
- Indonesia enforces a state-led halal assurance system managed by BPJPH and structured under HAS 23000:1/2. Audits are carried out by certified auditors and span the full production chain, including batch-specific documentation and full traceability. Although

highly transparent, this system is administratively intensive, often causing delays in the certification timeline;

- Turkey emphasises the independence and accreditation of certification bodies in line with OIC/SMIIC 2. Companies must maintain a documented Halal Assurance System, conduct routine internal audits, and uphold defined SOPs. While the alignment with ISO standards improves global recognition, costs related to audits and re-certification can be considerable; and
- UAE operates a formalised audit and documentation system anchored in Cabinet Resolution No. 10/2014. Certification bodies must adhere to ISO/IEC 17065 and ISO 19011. The GSO 2055-2:2021 standard ensures broad coverage, from supplier selection to final product release. This legal clarity supports regulatory consistency, though the associated documentation requirements and compliance processes may be resource intensive.

The following table outlines country-specific halal requirements for audits and documentation:

Table 2-11: Strictest halal requirements for audits and documentation

Category	No	Area	Strongest Halal-Requirements
Audits & Documentation	r	Audits	Annual internal + external audits, ISO-compliant, action plan (Malaysia/UAE)
	s	Processes and instructions	Halal Assurance System (HAS), mandatory training, digital proof (Indonesia)

2.4.5 GMOs and Enzymes

The evaluation of (t) genetically modified organisms (GMOs) and (u) enzymes is particularly relevant in the context of biotechnological pharmaceuticals and cosmetic products. Halal compliance in this area is determined by three main criteria: the origin of the substances (e.g. microbial vs animal-derived), the purity of the materials used, and complete traceability across the entire supply chain. These factors determine whether a product can be classified as halal, or whether unclear origins or the risk of contamination compromise its halal integrity.

A good practice example is the use of microbial derived enzymes that are produced without contamination by haram substances and whose supply chains are fully documented and subject to regular audits. These enzymes are commonly used in capsule production, in breaking down molecules during drug development, and in the fermentation processes used to produce active ingredients. In contrast, genetically modified materials of animal or unclear origin, or those without clear information about their sources, are viewed as highly problematic in halal evaluations.

Standards compared:

- Malaysia: MS 2424, HAS 23201, GSO 2055-1, OIC/SMIIC 1;
- Singapore: MUIS-HC-S001, HalMQ, PRO Scheme;
- Indonesia: HAS 23201, BPJPH and LPPOM Guidelines;
- Turkey: OIC/SMIIC 1, OIC/SMIIC 24; and
- UAE: GSO 2055-1, MS 2424, OIC/SMIIC 50, GSO 2055-4, UAE.S 2055-4.

Country-specific insights:

- Malaysia applies detailed evaluation protocols under MS 2424 and HAS 23201 for fermentation-derived substances, explicitly covering enzymes and pharmaceutical use. By incorporating OIC/SMIIC 1 standards, Malaysia ensures compatibility with international systems. A key strength lies in its classification system, which considers the production medium and substrate purity when assessing enzyme sources;
- Singapore adopts a product-based certification approach through its PRO Scheme, placing strong emphasis on full genetic traceability. MUIS requires documentation at the molecular source level, which ensures a high level of transparency but also results in a considerable administrative burden, particularly in industries with frequent product reformulations;
- Indonesia implements a state-supervised system with strict requirements for documentation and traceability of biotechnology-based products. While effective in maintaining high compliance, the process can be time-consuming and difficult for companies developing ingredients or intermediates via fermentation;
- Turkey follows OIC/SMIIC 24, limiting permissible enzyme sources to microbial and vegetable-based inputs. Although this provides clear criteria, verifying origin and purity can be technically demanding, especially in cases where supply chains involve mixed inputs or materials with unclear traceability. The resulting verification responsibilities rest primarily with the manufacturers; and
- UAE adopts an integrated regulatory framework, combining national and regional standards such as GSO 2055-4 and OIC/SMIIC 50. Enzymes and GMOs are explicitly addressed in UAE.S 2055-4. Biotechnological inputs must be clearly documented in terms of origin and production process. Microbial enzymes are generally permitted if free from haram contamination, whereas animal-derived or genetically modified sources are only accepted with verifiable halal compliance.

The following table presents a structured comparison of GMO and enzyme certification requirements across the five countries. It provides an overview of the prevailing regulatory benchmarks for halal-sensitive biotech inputs:

Table 2-12: Strictest halal requirements for GMO and enzymes

Category	No	Area	Strongest Halal-Requirements
GMOs & Enzymes	t	Genetically modified organisms	Permitted only with halal-compliant origin; full traceability required (UAE)
	u	Enzymes	Only plant-based or microbial; fermentation medium halal, no animal contamination (Malaysia)

2.4.6 Benchmark Standards for Halal Certification

The primary objective of this subsection is to identify the most stringent and operationally effective halal certification standards in each key subcategory. This will form the basis for a coherent, practical, and internationally compatible reference framework tailored specifically to the chemical-pharmaceutical sector.

Evaluation methodology

To ensure consistency and comparability across these diverse frameworks, a three-stage evaluation model has been applied using a traffic-light approach:

- Benchmark: Requirements are comprehensive, clearly defined, and consistently implemented. These elements represent international best practice;
- Attention: Standards are partially specified, open to interpretation, or vary in national implementation; and
- Critical: Standards are weakly defined, inconsistently applied, or lack a formal regulatory basis.

This logic is summarised in the following table:

Table 2-13: Evaluation methodology – overview

Symbol	Description
	Comprehensive, consistent, and fully operationalised – suitable as a benchmark
	Partially flexible, subject to interpretation, or variable in implementation
	Weakly defined, incompletely implemented, or not anchored in regulation

Benchmark results by key category

Raw materials and ingredients: Malaysia and Indonesia

The combination of Malaysia's defined thresholds and Indonesia's strict exclusion of haram inputs offers a strong dual benchmark. Malaysia stands out for its scientific approach to

enzyme and ethanol assessment, while Indonesia enforces maximum raw material purity through legal exclusion principles.

Table 2-14: Benchmark results – raw materials and ingredients

Raw Materials & Ingredients				
Malaysia	Singapore	**Indonesia**	Turkey	UAE

Logistics and warehousing: Malaysia

Malaysia's MS 2400 series outline detailed logistics requirements across the entire value chain, from goods delivery to final distribution. The framework is fully implemented in practice. While other countries align with international standards, they often lack the same degree of operational application.

Table 2-15: Benchmark results – logistics and warehousing

Logistics & Warehousing				
Malaysia	Singapore	Indonesia	Turkey	UAE

Manufacturing and processing: Singapore and Malaysia

Singapore maintains exceptionally rigorous facility and process controls, particularly under its Whole Plant (WP) Scheme. Malaysia complements this with technically detailed pharmaceutical standards and differentiated guidance on ethanol use in processing.

Table 2-16: Benchmark results – manufacturing and processing

Manufacturing & Processing				
Malaysia	**Singapore**	Indonesia	Turkey	UAE

Audits and documentation: Malaysia and UAE

Malaysia integrates religious values (MS 1900) with international auditing frameworks (ISO 17065/19011), creating a balanced halal QMS. The UAE complements this with a formalised legal system. Indonesia offers high transparency but faces challenges in terms of bureaucratic efficiency.

Table 2-17: Benchmark results – audits and documentation

Audits & Documentation				
Malaysia	Singapore	Indonesia	Turkey	**UAE**

GMOs and enzymes: Malaysia and UAE

Malaysia offers a clear and traceable system for assessing fermentation-derived enzymes and genetic modifications. The UAE builds on this by incorporating international reference standards and a multidimensional risk evaluation.

Table 2-18: Benchmark results – GMO and enzymes

GMOs & Enzymes				
Malaysia	Singapore	Indonesia	Turkey	**UAE**

Categories by clarity of requirements

The analysis indicates that while several halal criteria are interpreted consistently across jurisdictions, others vary depending on authority, infrastructure, and product context.

Areas with high consensus:

- Aquatic animals: Generally permitted based on safety evaluation;
- Land animals / pork: Universal exclusion of haram animals;
- Vegetable-based materials: Permitted with verifiable documentation;
- Petrochemicals: Permitted subject to proven purity;
- GMOs and enzymes: Evaluated based on origin, purity, and traceability; and
- Audit procedures: Widely based on ISO and recognised national standard.

Areas with uncertainty (depending on authority, infrastructure, and formulation):

- Slaughter (operators, tools, techniques): Varying scope of certification;
- Use of ethanol: Permitted or prohibited depending on use context;
- Procurement and storage: Inconsistent rules on contamination prevention;
- Production (equipment, environment): E.g. air systems, auxiliary circuits; and
- Packaging: Varying requirements for certification and inspection depth.

Each of the benchmark countries defines internationally recognised standards in distinct areas of halal regulation. Malaysia stands out with a scientifically robust, operationally grounded, and religiously integrated system, offering strong international applicability. The United Arab Emirates provides a legally stringent and normatively consistent model, supporting regulatory certainty and global recognition. Indonesia ensures high traceability and raw material purity through strict legal enforcement, thereby setting elevated compliance standards across the supply chain. Singapore leads in technical process integrity and facility certification, although this reduces operational flexibility for manufacturers.

2.5 Standardised Halal Checklist

2.5.1 Category-Based Checklist – Scope and Requirements

The development of a universal halal checklist represents an important step towards strengthening internal quality assurance in internationally operating companies and aligning the differing expectations of major halal certification bodies.

The present overview is based on a detailed analysis of the five main categories of the halal compliance system:

- Raw materials and ingredients (a–g): Clear requirements concerning origin, safety, and processing (e.g. ethanol or gelatine);
- Logistics and warehousing (h–l): Strict segregation, documentation, and traceability throughout the supply chain;
- Manufacturing and processing (m–p): Requirements concerning cleaning procedures, production zones, and packaging;
- Audits and documentation (r–s): Mandatory internal/external audits and SOPs under a Halal Assurance System; and
- GMOs and enzymes (t–u): Only vegetable-based or microbial sources with documented purity are permitted.

This framework reflects the highest internationally recognised requirements and draws upon accepted standards such as MS 1500, HAS 23000, GSO 2055, HalMQ, and OIC/SMIIC 1. It is designed to be:

- Compatible with established frameworks, including ISO 17065, ISO 22000, ISO 9001, GMP, and HACCP;
- Tailored to the specific regulatory and operational context of the chemical-pharmaceutical sector; and
- Globally applicable as a reference tool for halal certification.

Companies seeking halal certification should treat all 21 criteria of this checklist as mandatory. The matrix serves as a practical instrument for internal audits, risk assessments, and certification planning.

The checklist functions as a universal guideline that:

- Reduces regulatory complexity;
- Structures certification processes; and

- Bridges divergences in national interpretation and application.

For each category, the strictest international requirements were identified and defined as minimum standards:

Raw materials and ingredients (a–g):

This category addresses the composition and origin of raw materials, which form the foundation of any halal certification.

- (a) Aquatic animals are generally considered halal, provided they are non-toxic and safe for human consumption;
- (b) Land animals and carnivores are subject to strict exclusion, particularly species such as pigs and predators;
- (c) Ethanol is permitted only in trace amounts (typically up to 0.5%, according to Malaysian guidelines) when it is technologically necessary and no alternative is possible;
- (d) Petrochemical substances are halal only if their purity and absence of haram contamination can be demonstrably ensured;
- (e, f) Animal slaughter must be conducted by a practising Muslim using a sharp instrument, without prior stunning that causes death; and
- (g) Vegetable-based ingredients are generally halal but must be protected against cross-contamination and must be fully traceable.

Logistics and warehousing (h–l):

This category ensures halal integrity across storage, transport, and handling.

- (h) Filling and loading processes must utilise either dedicated halal lines or validated cleaning protocols between product types;
- (i) Storage areas for halal goods must be physically segregated from non-halal products;
- (j) Transportation must be fully traceable through labelling, documentation, and auditable logistics systems;
- (k) Procurement must prioritise halal-certified suppliers or require verified source documentation to demonstrate compliance; and
- (l) Raw materials must be stored either in designated halal zones or protected through validated cleaning and segregation processes.

Manufacturing and processing (m–p):

This segment addresses contamination risks and demands comprehensive process control.

- (m) Ethanol use in production is only permitted if it is residue-free, technologically justified, and fully documented;
- (n) Shared production equipment must be subject to documented cleaning protocols, and halal and non-halal production must be clearly separated;
- (o) Packaging materials must exclude animal-based adhesives and alcohol-containing inks and must be halal-compliant; and
- (p) Facility structures must either feature halal-designated zones or provide clearly documented records of usage history and sanitisation.

Audits and documentation (r–s):

Traceability of all halal-relevant processes is essential for certification.

- (r) Internal and external halal audits must be conducted at least once per year, with corrective actions fully documented and monitored; and
- (s) Process documentation and standard operating procedures (SOPs) must be formally embedded within a Halal Assurance System or equivalent quality framework.

GMOs and enzymes (t–u):

This category concerns the assessment of biotechnologically derived materials.

- (t) Genetically modified organisms (GMOs) are permissible only if derived from halal-compliant genetic sources, with full documentation across the production chain; and
- (u) Enzymes must originate from plant-based or microbial sources, and the fermentation substrates used in their production must be halal-compliant and traceable.

2.5.2 Halal Checklist

The checklist presented below builds directly on the benchmark analysis outlined in the preceding Section 2.4. It translates the most stringent international halal requirements into a structured and operational tool, with clearly defined, measurable, and auditable criteria across all key domains (see Table 2-19).

Table 2-19: Halal checklist

Category	No	Area	Strongest Halal-Requirements
Raw Materials & Ingredients	a	Animal-based (aquatic animals)	Only non-toxic species, halal-compliant documentation
	b	Land animals / predators	Exclusion of all haram species, only materials from halal-slaughtered animals)
	c	Ethanol in the recipe	Limit ≤ 0.5%, technically necessary, fully evaporated
	d	Petrochemical raw materials	Permitted with documented purity, no alcohol contact
	e	Slaughter (animals)	State-recognised method, certified and documented
	f	Slaughter (tools)	Only sharp, approved tools, documented application
	g	Vegetable-based	Generally permitted, but origin and storage must be documented
Logistics & Warehousing	h	Product filling and loading	Separate production lines or documented cleaning procedures
	i	Product storage	Physical separation, climate control
	j	Product transport	Documented segregation, transport seals, halal logistics
	k	Raw material procurement	Only certified suppliers, traceability required
	l	Raw material storage	Separate storage zones or documented cleaning cycles
Manufacturing & Processing	m	Ethanol in the process	Permitted if technically necessary and fully evaporated
	n	Product manufacture	Samak cleansing, separate facilities, airflow control
	o	Product packaging	Only certified materials, no animal or alcohol contact
	p	Product plants	Audited infrastructure, samak if required, halal zones
Audits & Documentation	r	Audits	Annual internal + external audits, ISO-compliant, action plan
	s	Processes and instructions	Halal Assurance System (HAS), mandatory training, digital proof
GMOs & Enzymes	t	Genetically modified organisms	Permitted only with halal-compliant origin; full traceability required
	u	Enzymes	Only plant-based or microbial; fermentation medium halal, no animal contamination

By drawing on insights from various regulatory systems, the checklist offers a clear and consistent framework that links religious principles with industrial practice and legal compliance. This is particularly relevant in highly regulated sectors such as the chemical and pharmaceutical industry.

The framework reflects both normative expectations and practical constraints, ensuring that halal implementation is feasible without compromising core principles. With its cross-border relevance, the checklist functions both as a diagnostic tool and as a practical guide for implementation.

It supports companies in identifying regulatory gaps, prioritising corrective actions, and aligning their internal systems with international certification requirements. Companies seeking halal certification are encouraged to treat all 21 control points as mandatory benchmarks rather than optional recommendations.

This approach enables systematic gap analysis and supports the structured integration of halal requirements into existing quality management systems.

2.5.3 Integration of the Halal Checklist with Existing Regulatory Standards

Halal certification requirements frequently align with internationally recognised quality and safety frameworks such as ISO, GMP, and HACCP. This compatibility facilitates the structured integration of halal certification into existing operational and quality management systems, thereby reducing redundancy and administrative burden. The checklist serves as a practical foundation for embedding halal criteria within established regulatory structures.

Synergies with ISO standards

The halal checklist aligns particularly well with the following ISO standards:

- ISO 9001 (Quality Management): Categories such as audits and documentation, manufacturing, and logistics require traceable processes, comprehensive documentation, and continuous improvement measures—all of which are core principles of this standard;
- ISO 22000 (Food Safety): Requirements related to traceability, hazard analysis and control measures closely mirror halal expectations for raw materials, storage and transport;
- ISO 17065 (Product Certification): This standard is used by halal authorities such as JAKIM, HAK, and LPPOM MUI as a basis for the accreditation of certifying bodies—providing a direct link to halal auditing practices; and
- ISO 19011 (Auditing of Management Systems): This standard fully covers the procedural requirements for internal and external halal audits.

Companies with established ISO management systems can integrate halal-specific checkpoints—such as the verification of animal-derived ingredients or ethanol content—into their existing audit formats without requiring major structural adjustments.

Compatibility with GMP requirements

In the pharmaceutical and cosmetics sectors, compliance with Good Manufacturing Practice (GMP) is mandatory. Many elements of the halal checklist are directly compatible with GMP standards:

- Production environments: Cleanliness, material flow, and personnel hygiene are core GMP requirements and equally relevant to halal-compliant facilities;
- Cleaning procedures: GMP protocols for preventing cross-contamination can be extended to incorporate halal-specific cleansing methods; and
- Batch traceability: The GMP requirement for full traceability can be enhanced by halal documentation (e.g. halal certificates).

A GMP-certified chemical or pharmaceutical manufacturer could incorporate halal-specific raw material categories into its formulation documentation, without needing to amend core SOPs.

Extending existing HACCP and HARA concepts

In the process industries, hazard analysis systems such as HACCP (Hazard Analysis and Critical Control Points) and HARA (Hazard Analysis and Risk Assessment) are widely implemented. The halal checklist complements these frameworks by adding religious and cultural risk dimensions, which can be integrated into existing control systems:

- Critical control points may include the use of non-certified enzymes, unclean transport containers or alcohol-based solvents; and
- These risks can be designated as halal specific CCPs and monitored accordingly within a HACCP structure.

In a HACCP plan for a dietary supplement, an additional CCP (titled: Certificate Verification for Gelatine Capsules) could be introduced to ensure halal compliance.

Advantages of integration

The targeted integration of the halal checklist into existing regulatory standards offers multiple benefits:

- Increased efficiency: Inspection redundancies are avoided, and existing audit processes remain in place;
- Cost reduction: Lower training requirements and clearly defined procedures improve implementation;

- Market access: Combined certifications increase credibility and acceptance in international markets; and
- Compliance assurance: Religious and regulatory requirements are addressed at the same time.

The halal checklist does not function as a stand-alone tool, but rather as an integrative element within broader corporate compliance frameworks. Organisations already certified to ISO or GMP standards particularly benefit, as the checklist facilitates access to halal-sensitive markets without requiring extensive modifications to existing systems. This demonstrates that halal certification can be implemented as a rational, process-oriented component of global corporate governance—extending its relevance beyond purely religious foundations.

2.5.4 Scientific Validation and Strategic Relevance of the Halal Checklist

As established in the previous sections, halal certification extends beyond religious considerations and increasingly demands integration into technical, regulatory, and operational frameworks. The development of the halal checklist is therefore based not only on regulatory analysis and industrial best practices but also on robust scientific, technical, and economic foundations. Recent academic research emphasises that halal certification should be viewed as a core element of strategic corporate governance. The checklist addresses key certification challenges by translating religious, technical, and institutional requirements into a structured and standardised system.

Numerous studies have shown that halal should not be treated as an isolated religious concept but rather as a comprehensive governance framework covering the entire supply chain. Kamaruddin *et al.* (2016) and Tieman (2011, 2015) highlight the importance of halal integrity—from raw material sourcing to final distribution. In particular, Tieman (2015) points to the growing complexity and fragmentation of halal requirements, calling for systematic and coordinated approaches. This perspective is supported by Agustina and Cakravastia (2023), who argue that halal requirements must be considered within a broader framework of economic, environmental, and social objectives.

Scientific literature also contributes valuable insights into material categorisation and process risk. Matissek (2009) and Krist (2013) provide foundational insights into the chemical and physical assessment of critical components such as animal-derived gelatine and vegetable-based alternatives. Usmani (2018) and the Halal Research Council (HRC, 2024) offer key religious and legal guidance on ritual slaughter, cleansing, and the handling of haram-related risks. These

contributions are crucial for clearly defining and categorising the halal control points integrated into the checklist.

At the same time, academic research highlights persistent challenges in the international harmonisation of halal frameworks. Hassan and Harun (2018) and Khan and Haleem (2016), note that multinational companies face significant barriers, as certifications are often not mutually recognised and interpretations differ nationally. This regulatory fragmentation leads to increased documentation requirements, longer approval timelines, and greater legal uncertainty. Robaczewska, Vanhaverbeke, and Lorenz (2019) demonstrate through a case study in the pharmaceutical sector that certification systems are most effective when based on clearly defined, transparent, and institutionally procedures.

The strategic relevance of a standardised halal checklist lies not only in regulatory compliance, but also in operational efficiency. Suhaimee, Abdullah, and Alias (2019) argue that a unified halal checklist enhances transparency, efficiency, and quality assurance for both businesses and certifying bodies. Subri, Omar, and Mamat (2022) further observe that halal certification is increasingly regarded as a reliable indicator of product quality and trustworthiness, even beyond Muslim consumer groups. The checklist reflects this development by systematically linking audit systems with consumer expectations and regulatory oversight.

While Noordin, Laila, and Samicho (2014) and Kamaruddin *et al.* (2016), stress the importance of organisational structure in achieving halal certification success, Mumuni and Kamarulzaman (2018) highlight the cultural and geopolitical factors that contribute to divergent national interpretations. In this context, the checklist provides a pragmatic basis that combines religious principles with technical feasibility and international applicability.

In conclusion, the halal checklist offers a practical, evidence-based, and internationally recognised tool for implementing halal certification. It enhances auditability, supports operational planning, and strengthens competitiveness in global markets. Its theoretical foundation and regulatory alignment position it as a strategic instrument for future-oriented halal compliance in complex industrial contexts.

2.6 Practical Challenges of Halal Requirements

Section 2.6 examines the practical challenges associated with implementing halal requirements in industrial contexts. It addresses both operational constraints at the company level and broader regulatory inconsistencies across international halal system.

2.6.1 Operational and Technical Challenges

Halal certification extends beyond religious considerations and increasingly demands integration into technical, regulatory, and operational frameworks. A key challenge is the operational effort required to meet country specific halal certification rules. This often affects product formulation, such as replacing animal based ingredients with vegetable-based alternatives, which may require new technologies or additional regulatory approvals (Zakaria, Musa and Gani, 2019). In addition, packaging, storage, and transport procedures must be adapted to reliably prevent cross-contamination (Azam and Abdullah, 2020).

A further significant constraint is the limited availability of halal-compliant raw and auxiliary materials. This is especially problematic in the case of enzymes, gelatine, or certain excipients, where halal-compliant alternatives are either not readily available in sufficient quality or require extensive documentation to demonstrate compliance (Rahem, Effendi and Faridah, 2021). This challenge is further intensified in contract manufacturing settings and in complex international supply chains. Ensuring full traceability and transparency throughout the entire supply network is therefore essential, and this is directly addressed in the halal checklist developed in Subsection 2.5.1.

Additional demands arise within the production environment. In some countries, it is already required that only Muslim personnel be involved in manufacturing, packaging, and logistics processes (Mathew, Abdullah and Ismail, 2014; Ahmad and Shariff, 2016; Kamaruddin *et al.*, 2016). Deviating interpretations also exist regarding equipment cleaning: while some authorities accept GMP-compliant cleaning procedures, others insist on ritual purification, particularly where animal-derived residues are involved (Kadir *et al.*, 2016; Hassan and Harun, 2018).

The classification of critical ingredients, such as fermentative enzymes or alcohol-based solvents, is also subject to inconsistent regulatory interpretations. Depending on the certifying authority, the source, method of production, and final formulation may be assessed differently (Pratikto *et al.*, 2021; Hayat, Kumar and Sazili, 2023). These discrepancies require precise and well-structured documentation of all materials used, a need directly addressed by the categorisation in the halal checklist.

One frequently underestimated factor is personnel training. Numerous studies have shown that a lack of awareness of halal requirements is a major cause of certification failure (Ab Talib, Abdul Hamid and Chin, 2016; Kamaruddin *et al.*, 2016; Akram, 2022). Accordingly, continuous, role-specific training is essential to prevent procedural errors and to ensure sustained compliance.

Halal implementation in industrial contexts involves a high degree of technical and procedural complexity, which is further intensified by cultural, religious, and regulatory variation. The checklist developed offers a practical framework for minimising compliance risks and for facilitating implementation across heterogeneous supply and production systems.

2.6.2 Various Halal Approaches: Strategic and Regulatory Perspectives

Halal certification has developed over time from a purely religious concept into a strategically important regulatory system with growing relevance in international markets. Its implementation differs between countries, depending on national standards and religious interpretation.

A core challenge stems from the absence of a harmonised regulatory framework at the international level. To date, no globally recognised halal standard exists. Instead, national certification authorities apply distinct and sometimes conflicting criteria, leading to inconsistencies, ambiguities, and the frequent need for multiple certifications (Miskam *et al.*, 2015; Azam and Abdullah, 2020). This regulatory heterogeneity considerably limits the international acceptance of halal certificates.

In addition, halal has become increasingly intertwined with economic and political agendas. Malaysia, for instance, has strategically positioned itself as a leading global halal hub. As noted by Suhaimee, Abdullah and Alias (2019), this positioning involves not only the setting of standards through JAKIM but also the active promotion of halal products in international markets. However, this strategy has faced criticism. Aziz and Chok (2013), together with Elasrag (2016), argue that the increasing commercialisation of halal risks undermining its normative and spiritual foundations, potentially reducing it to a marketable label rather than a values based religious practice.

In response to such concerns, Noordin, Laila and Samicho (2014) propose the concept of a halal ecosystem, which aims to integrate public, semi-public, and private actors within a coordinated governance model. They argue that halal should be understood not merely as a religious requirement, but as a strategic value chain extending from production and packaging through to logistics and the final consumer. Information systems are regarded as core elements of halal governance, as they enable transparency and traceability throughout the halal supply chain (Kamaruddin *et al.*, 2016).

At the same time, Bin Haji Ishak and Abdullah (2012) caution against placing too much dependence on nationally centralised systems, such as Malaysia's JAKIM framework. In their

view, such rigid regulatory structures risk institutional stagnation and may hinder the development of an inclusive international dialogue on halal standardisation.

Given the complexity of global supply chains, there is growing demand for a scalable and harmonised halal system that ensures international consistency while accommodating regional and cultural specificities. Robaczewska, Vanhaverbeke and Lorenz (2019) underscore the importance of inclusive stakeholder networks, particularly in sectors such as the pharmaceutical industry. These networks require agility and adaptability—qualities identified as critical success factors (Sivam *et al.*, 2019).

Unresolved regulatory fragmentation can lead to substantial costs, including repeated certification processes, delayed market access, and diminished competitiveness (Elgammal *et al.*, 2017). The development of clear, strategic frameworks is therefore essential for managing complexity and ensuring long-term compliance.

2.7 Germany and Islam: Context and Market Environment

This section examines the historical, social, and economic context of Islam and halal in Germany. It begins with an overview of Muslim migration and demographic trends, followed by an analysis of religious diversity, legal frameworks, and public attitudes towards Islam and halal. The section also underscores Germany's position as Europe's largest economy, with particular emphasis on the export-oriented chemical and pharmaceutical sector.

2.7.1 Islam in German History

The presence of Islam in Germany dates back several centuries, with early references in the Middle Ages through trade and diplomatic contact. However, Islam only began to significantly shape the country's religious and social landscape in the mid-20th century, particularly during the 1960s and 1970s. This shift was largely driven by the recruitment of so-called Gastarbeiter (guest workers), many of whom came from predominantly Muslim countries such as Turkey, Morocco, and Tunisia.

Germany, historically shaped by Christian and Western cultural values, underwent major demographic changes after the Second World War. On 30 October 1961, the Federal Republic of Germany signed a recruitment agreement with Turkey to support post-war economic recovery. These workers were mostly employed in industrial mass production, heavy industry, and mining—primarily in low-skilled roles. Originally intended as a short-term labour programme, the agreement did not anticipate long-term settlement. Similar agreements followed with Morocco (1963) and Tunisia (1965).

Initially arriving alone, many workers were later joined by their families, as their stays lengthened and the economy continued to rely on their labour. Between the first agreement with Italy in 1955 and the final one with Yugoslavia in 1968, almost four million foreign workers came to Germany before recruitment was halted in 1973 due to the oil crisis. Family reunification then helped stabilise the Muslim population and reduce return migration.

Further immigration waves in the 1990s, particularly due to the Balkan wars and political instability in Kurdish regions of Turkey (Seifert, 2012), contributed to the increasing visibility of Islam in German society. Over time, Islam has become a recognised part of German society, shaped by demographic change, new generations, and ongoing debates about integration and religious freedom.

As a result, the Muslim population, a key consumer base for halal products, has grown steadily. From around 6,000 Muslims in 1945, the number reached 500,000 by 1972, 1.2 million by 1976, and exceeded 2.7 million by 1995 (Statista, 2020). Between 2011 and 2015, a further 1.2 million Muslims migrated to Germany. Currently, around 5.5 million Muslims reside in the country, about 50% of whom have Turkish heritage (SZ, 2021).

This development has contributed to increasing religious and cultural pluralism, with wide-ranging effects on politics, society, and consumer markets. Nevertheless, Islam and halal remain politically and emotionally sensitive topics, especially in debates surrounding integration, identity, and religious freedom (Rohe, 2009). Companies engaging in halal production must therefore consider both the market potential and the wider socio-political context. Gontek (2019) notes that while halal is widely considered a growth sector, scepticism persists, often due to limited understanding of the religious and cultural foundations.

2.7.2 Societal, Demographic, and Religious Aspects

Germany is a pluralistic society influenced by a range of ethnic, cultural, and religious backgrounds. In 2023, the population stood at approximately 84 million (Destatis, 2022a, 2023), making it the most populous EU member state. Around 19% of the population has a migration background, and 23%—roughly 19 million people—either migrated after 1949 or were born abroad (FAZIT, 2018; Eurostat, 2022).

Religious diversity reflects these demographic shifts. As of 2024, Christians made up around 45% of the population, Muslims 3.9% (approximately 3 million practising individuals), and 47% were unaffiliated (fowid, 2025). Broader estimates suggest that approximately 5.5 million people identify as Muslim, including those who identify culturally rather than religiously. Islam is now

the second-largest religion in Germany after Christianity. The majority of Muslims have Turkish roots, followed by communities from Bosnia and Herzegovina, Kosovo, Syria, and Afghanistan. This population is relatively young, increasingly urbanised, and often German-born—typically second or third generation.

This demographic profile is linked to a rising demand for halal-compliant products and services (Evans and Syed, 2015). Public institutions such as schools and healthcare facilities increasingly accommodate religious dietary and cultural needs. Simultaneously, a growing interest in ethical consumerism among younger Muslim generations is strengthening demand for halal-certified food, cosmetics, and pharmaceuticals (Dinar Standard, 2023).

Although halal certification is based on religious principles, it is widely regarded as a marker of ethical and quality standards—a perception shared by many non-Muslim consumers as well. While halal certification is most established in the food sector, awareness is expanding into the chemical and pharmaceutical industries, where alignment with halal standards can offer a clear competitive edge (Evans and Syed, 2015; Dinar Standard, 2023).

2.7.3 Germany´s Economic Outlook and Market Potential

Germany, as Europe's largest economy and a founding member of the European Union, is a key factor in global trade and regulatory standard-setting. In 2023, Germany's GDP reached USD 4.2 trillion, ranking fourth worldwide after the United States, China, and Japan (Statista, 2023b, 2023a; The World Bank, 2024). Its economy is strongly export-driven, with leading sectors including automotive, engineering, chemicals, and pharmaceuticals. The latter two are particularly relevant for the halal market, as international interest in halal-compliant production continues to grow. Chemical and pharmaceutical products are already highly export-oriented and well positioned to benefit from halal certification.

As Figure 2.3 below illustrates, Germany's economic growth has fluctuated significantly over the decades.

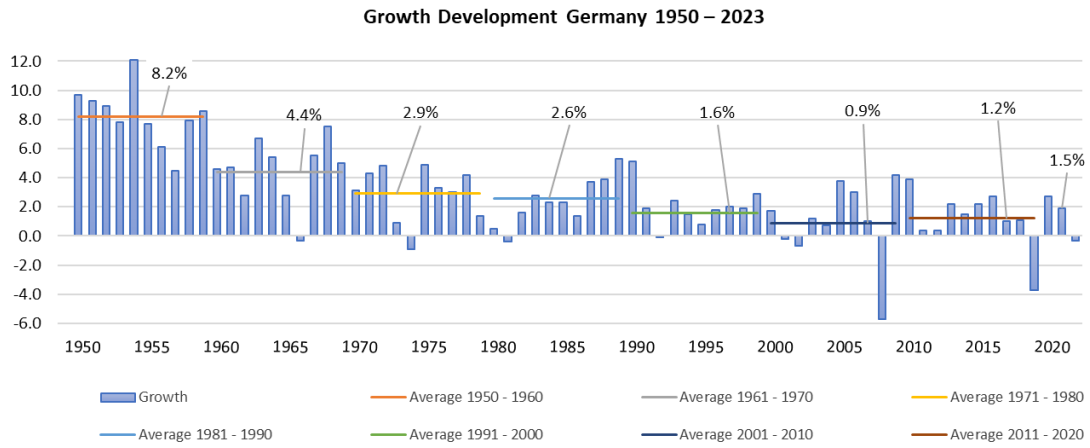


Figure 2-3: Growth development Germany 1950 – 2023 (Rutkowski, 2024)

During the post-war boom, GDP increased by 8.2% between 1950–1960 and by 4.4% between 1961–1970. Growth slowed in subsequent decades, averaging only 0.9% annually from 2010–2020. In 2023, GDP declined by -0.3%, primarily due to the energy crisis (Destatis, 2022b; ZEW, 2022).

Despite this modest growth, Germany remains a stable, strategically important market. From 2000 to 2020, it achieved an average annual growth rate of 1%, compared to 3% across OIC countries (SESRIC, 2021). While growth is slower, Germany's regulatory stability, industrial infrastructure, and export capabilities continue to make it attractive for halal production and certification.

However, challenges remain. Germany currently lacks a unified national halal certification framework, and its domestic certifiers often lack international recognition. To strengthen global competitiveness, producers are advised to adopt internationally recognised standards and collaborate with leading halal authorities in OIC countries. This approach would help build trust and position Germany as a key halal export hub within Europe.

2.7.4 Role of Chemical-Pharmaceutical Sector in Germany

Germany's chemical-pharmaceutical sector plays a central role in both the national economy and international trade. In 2023, it generated EUR 225.5 billion in revenue and employed approximately 470,000 people, underscoring its importance in innovation, export, and employment (VCI, 2024).

Key product areas include:

- Pharmaceutical products: Basic products and specialities; and

- Chemical products: Polymers, speciality chemicals, detergents, inorganic chemicals and petrochemicals and derivatives.

Table 2-20: Total sales of the chemical-pharmaceutical industry 2020 – 2023 (Rutkowski, 2024)

Total sales of the chemical-pharmaceutical industry*	2020 [Mrd. in EUR]	2021 [Mrd. in EUR]	2022 [Mrd. in EUR]	2023 [Mrd. in EUR]
Chemical and pharmaceutical goods	**190.6**	**227.1**	**261.2**	**225.5**
Chemical industry	**143.4**	**172.4**	**202.4**	**166.8**
Anorganic basic chemicals	11.7	13.8	20.4	16.3
Petrochemicals & Derivatives	46.4	58.9	74.3	54.0
Polymers	24.2	48.6	35.3	28.7
Fine and specialty chemicals	48.6	55.3	57.4	53.1
Detergents and body care products	12.5	13.1	14.9	14.6
Pharmaceutical industry	47.2	**54.7**	**58.8**	**58.7**

* Sales including trading and non-trading sales (VCI delimination))

The sector is export-oriented, with production sites distributed across global markets to meet regional demand efficiently. As international expectations around transparency, traceability, and ethical compliance continue to grow, halal certification is becoming increasingly relevant. It aligns well with broader ESG goals and sustainability initiatives within the industry.

In 2023, Germany exported around EUR 1 billion in halal-certified cosmetics and EUR 5 billion in pharmaceuticals to OIC countries (VCI, 2024). However, many products remain uncertified—posing both regulatory risks and missed market opportunities (Dinar Standard, 2023). This underscores the growing need to expand halal certification capacity and ensure alignment with internationally recognised standards.

Halal certification should not be seen as a restriction, but rather as a strategic opportunity. Integrating halal principles into existing quality management systems, documentation processes, and staff training can enhance competitiveness and improve access to high-growth global markets. A robust halal compliance system adds long-term strategic value for German manufacturers and strengthens their position and reputation in international markets.

2.8 Halal Demand and Market Dynamics

This section explores the strategic context of halal-certified products. It begins by examining global demographic trends—particularly the growth of the Muslim population in Asia and Africa—which highlight the rising economic significance of the halal market. It then analyses the development of halal-relevant segments, demonstrating how regulation, consumer behaviour, and product innovation are playing an increasingly central role in shaping corporate strategy.

2.8.1 Muslim Population and Religious Affiliation

The demographic expansion of the global Muslim population highlights the medium- and long-term relevance of the halal market. According to projections by the United Nations (2023b) and Pew Research Center (2021), the global population is expected to grow by approximately 35% to 9.8 billion by 2050. However, the Muslim population will grow disproportionately, with an estimated increase of over 80%, raising the global Muslim share from 23% in 2010 to around 30% in 2050.

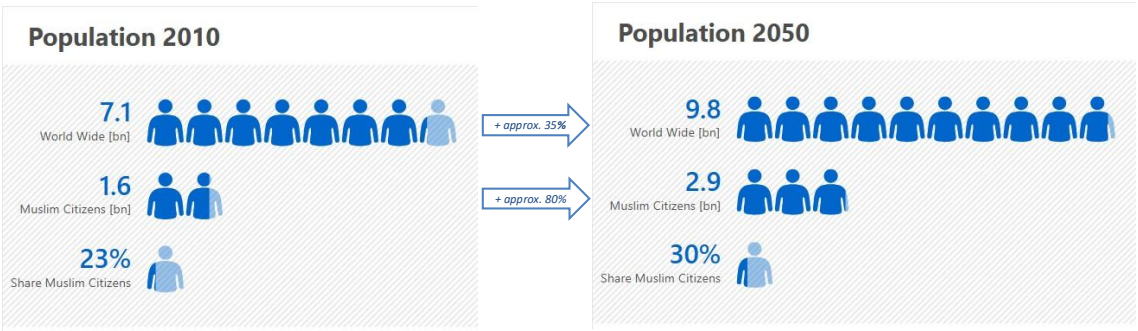


Figure 2-4: Population growth and Muslim share 2010 – 2050 (Rutkowski, 2024)

Africa and Asia are the main drivers of this development. Africa's population is projected to increase by 140%, from 1 billion to 2.5 billion, while Asia will grow by about 25%, from 4.3 to 5.4 billion. Europe, by contrast, is expected to experience a slight population decline (Eurostat, 2022; United Nations, 2023a, 2023b).

By 2020, Africa was home to around 500 million Muslims, and Asia to approximately 1.1 billion, a figure that is expected to grow considerably. By 2050, approximately 2.5 billion Muslims—representing about 85% of the world's Muslim population—will live in these two continents (Pew Research Center, 2021; IndexMundi, 2023).

These shifts are reflected not only in population figures but also in religious affiliation patterns. A long-term analysis shows that the proportion of Christians worldwide will decrease from 35% in 1950 to 31% in 2050, while the share of Muslims will double from 14% to around 30%. This transformation is illustrated in following table.

Table 2-21: Religion share 1950 – 2050, worldwide (Rutkowski, 2024)

World	1950	2000	2010	2020	2030	2040	2050
Christians	35%	32%	31%	31%	31%	31%	31%
Muslims	14%	22%	23%	25%	27%	28%	30%
Hindus	13%	14%	15%	15%	15%	15%	15%
Buddhists	7%	8%	7%	7%	6%	6%	5%
Folk Religions	9%	6%	6%	6%	5%	5%	5%
Jews	< 1%	< 1%	< 1%	< 1%	< 1%	< 1%	< 1%
Other Religions	< 1%	< 1%	< 1%	< 1%	< 1%	< 1%	< 1%
Unaffiliated	20%	17%	16%	16%	15%	14%	13%

At the same time, this trend has significant market implications for halal-relevant sectors—particularly consumer health, pharmaceuticals, and personal care. The growth of the global Muslim population is closely associated with rising demand for halal-compliant products, not only in emerging markets but increasingly also in established industrial economies.

Export-oriented sectors must therefore reconsider their strategic approach to halal. For the German chemical–pharmaceutical industry—renowned for its global reach and regulatory leadership—halal certification should be viewed as an integral component of long-term corporate strategy rather than a niche or optional add-on.

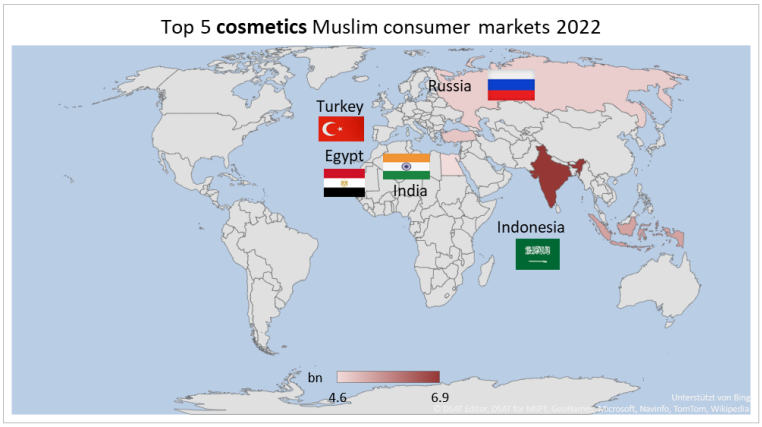
In conclusion, demographic developments strongly indicate a continued rise in global demand for halal-certified products, particularly in Asia and Africa. For German industry, adherence to halal standards is set to play an increasingly critical role in ensuring competitiveness, securing market access, and aligning with evolving strategic priorities.

2.8.2 Halal Market Development

2.8.2.1 Cosmetic market

Muslim spending on cosmetics (which is not synonymous with halal products), categorised as hair care, skincare, make-up, perfume, deodorants, sunscreen, etc., was approximately USD 84 billion in 2022 and is expected to increase to around USD 129 billion by 2027. This represents a compound annual growth rate (CAGR) of 8.9%.

The following figure shows the top five consumer Muslim markets for cosmetic products in 2022: India (USD 6.9 billion), Indonesia (USD 5.4 billion), Turkey (USD 4.9 billion), Russia (USD 4.8 billion), and Egypt (USD 4.6 billion). Together, these five countries account for about USD 27 billion, or approximately 32% of the total cosmetics market (Dinar Standard, 2023).



No	Country	bn
1	India	6.9
2	Indonesia	5.4
3	Turkey	4.9
4	Russia	4.8
5	Egypt	4.6

Figure 2-5: Top 5 cosmetics Muslim consumer markets 2022 (Rutkowski, 2024)

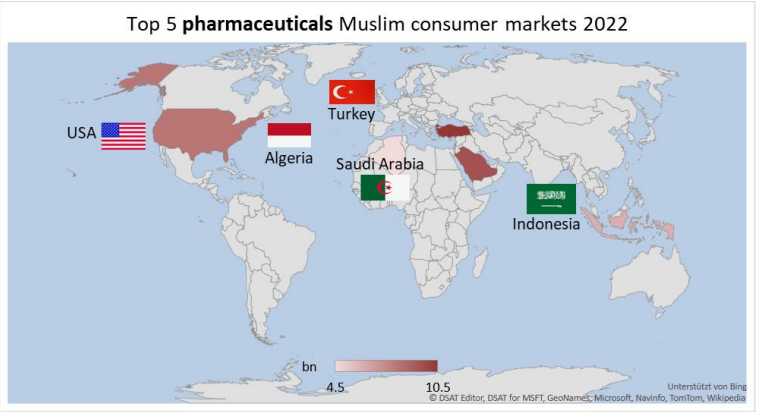
Spending by Muslim consumers before the pandemic had shown a strong upward trend towards natural, organic, and halal-certified cosmetics. However, with the onset of the pandemic, spending declined, particularly on beauty and cosmetic products—especially make-up (Spagnuolo *et al.*, 2020).

In response, companies introduced new product innovations tailored to regional markets; for example, special Ramadan product lines in Southeast Asia, halal-certified creams and sprays for the Indonesian market by Nivea (2023), and halal-certified cosmetics by Douglas (The Jiji Press Ltd, 2020). As in most industries, the pandemic accelerated the focus on digitalisation and e-commerce (Dinar Standard, 2022, 2023).

2.8.2.2 Pharmaceutical market

Regarding Muslim spending on pharmaceutical products (also not synonymous with halal products), this amounted to approximately USD 108 billion in 2022, with expectations to increase to around USD 142 billion by 2027. This represents a CAGR of 5.7%.

The top five consumer markets for Muslim pharmaceutical products in 2022, as illustrated in the figure below, are Turkey (USD 10.5 billion), Saudi Arabia (USD 9.5 billion), the USA (USD 8.2 billion), Indonesia (USD 6.1 billion), and Algeria (USD 4.5 billion). These top five countries account for more than a third of the total market, totalling almost USD 39 billion or 36% (Dinar Standard, 2022, 2023).



No	Country	bn
1	Turkey	10.5
2	Saudi Arabia	9.5
3	USA	8.2
4	Indonesia	6.1
5	Algeria	4.5

Figure 2-6: Top 5 pharmaceuticals Muslim consumer markets 2022 (Rutkowski, 2024)

Innovation within the halal pharmaceutical segment is gaining momentum, with notable examples such as the development of a halal-certified COVID-19 detection kit in Singapore for the UK market. However, the sector remains both technically and religiously complex—particularly in the absence of a globally recognised halal pharmaceutical standard.

The COVID-19 pandemic exposed structural vulnerabilities in the halal pharmaceutical ecosystem. Most companies focused on vaccine development, often at the expense of halal-compliant innovation. As of 2024, no halal-certified COVID-19 vaccine is available. At the same time, several OIC member states, including Malaysia and Indonesia, have intensified calls for halal-certified vaccines and the local production of pharmaceutical ingredients (Dinar Standard, 2023).

A key barrier remains regulatory fragmentation. Certification systems differ across jurisdictions, resulting in consumer uncertainty and operational challenges for manufacturers. Greater harmonisation will be essential to unlocking growth potential and facilitating international collaboration in this strategically important sector.

2.9 Strategic Orientation

This section traces the evolution of halal from a religious certification requirement to a strategic component of corporate governance. It outlines the management approaches, market drivers, and institutional frameworks that are essential for the long-term and sustainable integration of halal principles into corporate operations. The emphasis is placed on strategic alignment, international competitiveness, and long-term organisational relevance.

2.9.1 Trends and Approaches

To gain and maintain halal certification, companies must address halal compliance at the strategic level. Organisations that integrate halal criteria into their planning and governance

processes are better positioned to meet regulatory expectations, allocate resources effectively, and respond to evolving market opportunities.

Strategic decisions shape a company's long-term direction and define how it positions itself in the market (Epstein and Marckstadt, 2014; Gerpott, 2020). As Hyväri (2014) notes, strategy is more than planning—it requires implementation through clear objectives, competent teams, and effective communication (Radomska, 2014; Rani, 2019; Tawse and Tabesh, 2020).

Over time, strategic thinking has evolved in response to changing business environments. In the 1950s and 1960s, planning focused on internal control. The crises of the 1970s led to an increased focus on competitiveness, and thinkers like Michael Porter highlighted the importance of industry structure and competition. In the 1980s and 1990s, attention shifted to internal strengths, marking the rise of the resource-based view (Ungericht, 2012). Today, the focus is on innovation, agility, and knowledge sharing. This is particularly relevant in highly regulated and fast-moving sectors like chemicals and pharmaceuticals.

The following figure presents an overview of trends and strategic approaches from 1950 to the present:

Table 2-22: Trends and strategic management approaches 1950 – now (Rutkowski, 2024)

Period	1950	1960	1970	1980	1990	Current trends
Key areas	Budget planning and control	Long-term management planning	Corporate Strategy	Sector and competition analysis	Company specific competitive advantages	Managing change and complexity
Main aspects	Budget planning and financial control mechanisms	Growth planning	Diversification and portfolio planning	Selection of generic strategies, positioning in a sector	Internal competitive advantages	Innovation, transformability, knowledge transfer and competition
Core concepts and techniques	Investment planning	Investment and corporate planning, forecasts	Synergy, portfolio planning	Analysis of competition, competitors, experience	Resource analysis, corporate culture, personnel	Flexibility, Relationships
Implications for the organisation	Financial management as a centre of definition	Planning departments as centres of definition	Diversified and multi-divisional structures	Restructuring of the industry and active asset management	Restructuring, outsourcing	Virtual knowledge-based organisation, alliances and networks

Halal certification should be seen as a strategic advantage, not just a compliance obligation. In industries such as food, logistics, pharmaceuticals, and personal care, halal compliance:

- Enables access to fast-growing Muslim-majority markets;

- Strengthens brand credibility and ethical positioning; and
- Differentiates products in saturated and highly regulated environments.

National regulatory bodies such as JAKIM (Malaysia) and ESMA (UAE) have elevated the political and economic profile of halal, increasing pressure on international firms to align with evolving global standards. Halal has thus become a cross-cutting strategic factor, relevant for growth, internationalisation, and sustainability.

2.9.2 Drivers and Measurement Tools in the Global Halal Economy

The global halal economy is driven by a complex set of factors that extend beyond religious observance. These include evolving consumer expectations, targeted government policies, and the expansion of halal-relevant sectors into new domains such as pharmaceuticals, cosmetics, and finance.

The central drivers of the Islamic economy include:

- Changing consumer behaviour: Younger Muslim consumers—particularly millennials (born 1981–1996) and Generation Z (born 1997–2012)—increasingly seek products that align not only with Islamic principles but also with modern values such as sustainability, health, and transparency (Jihan, Hashim and Musa, 2014; Briliana and Mursito, 2017);
- Policy support: Initiatives such as Malaysia's Halal Industry Masterplan and Indonesia's Halal Law have institutionalised halal standards. Organisations like the OIC-SMIIC support harmonisation and international credibility; and
- Sector expansion: Halal is no longer limited to food. Pharmaceuticals, cosmetics, fashion, tourism, and finance are now core areas of interest within the global halal economy, presenting new opportunities for value creation (Akram, 2022).

For innovation-driven industries, halal certification increasingly serves as a signal of trust and quality—not merely a religious marker. It supports product development, market access, and supply chain integration.

To assess progress in these areas, the Global Islamic Economy Indicator (GIEI) provides a comprehensive benchmark. Covering 81 countries (including all 57 OIC members), the GIEI evaluates halal ecosystem development across seven sectors:

- Halal food;
- Islamic finance;
- Modest fashion;
- Muslim-friendly tourism;

- Islamic media and entertainment;
- Halal pharmaceuticals; and
- Halal cosmetics.

The indicator measures factors such as governance, industry performance, consumer awareness, and infrastructure. In the 2023 ranking, Malaysia led with 191 points, followed by Indonesia, the UAE, Turkey, and Singapore—all of which have demonstrated strong performance, particularly in the pharmaceutical and cosmetics segments.

Table 2-23: Global Islamic Economy Indicator 2023 (Rutkowski, 2024)

No	Country	GIEI	Islamic Finance	Halal Food	Muslim Friendly Travel	Modest Fashion	Media & Recreation	Pharma & Cosmetics
1	**Malaysia**	**193.2**	**408.7**	**128.0**	99.4	73.6	74.4	73.9
2	Saudi Arabia	93.6	194.9	48.5	99.7	34.3	37.5	34.3
3	Indonesia	80.1	93.2	94.4	60.7	66.3	52.4	58.6
4	United Arab Emirates	79.8	115.7	59.2	136.2	51.3	44.5	41.3
5	Bahrain	75.0	125.1	55.0	88.1	33.4	49.6	38.5
6	Iran	74.6	159.8	41.2	65.7	20.5	24.2	33.1
7	Turkey	74.0	46.1	85.1	**161.8**	**86.2**	46.0	52.6
8	Singapore	62.7	52.2	67.7	50.3	64.3	72.6	**79.9**
9	Kuwait	60.2	123.6	42.2	28.7	20.0	26.8	29.2
10	Qatar	57.1	74.4	49.7	60.4	37.4	63.3	37.2
11	Jordan	52.2	65.6	49.4	88.3	22.1	26.3	39.9
12	Oman	50.0	78.7	48.3	48.0	20.1	24.4	26.3
13	Pakistan	47.5	69.6	51.4	38.4	27.5	17.2	28.6
14	South Africa	44.7	51.1	53.8	25.3	32.4	31.9	43.2
15	United Kingdom	44.7	46.0	43.7	28.1	47.7	54.4	48.2

Countries such as Malaysia and Singapore are known for particularly stringent standards. Malaysia restricts imports of non-halal-labelled goods under strict regulatory controls to ensure compliance with both religious and public health objectives (ITA, 2024). Singapore's MUIS framework is widely recognised for its technical depth and rigour—especially in chemistry-based sectors.

The International Trade Centre (Evans and Syed, 2015) characterises halal not only as a religious obligation but also as a global economic system—one that combines spiritual identity with industrial strategy. In this sense, the GIEI serves not just as a ranking tool, but as a strategic planning instrument for governments and corporations alike.

2.9.3 Integrating Halal into Corporate Strategy

The role of halal within corporate strategy has undergone a fundamental transformation—from an operational necessity to a core element of strategic management. This shift is particularly evident in innovation-led, globally oriented industries such as pharmaceuticals and chemicals.

From reactive to proactive

Where halal certification was once a reaction to export requirements, leading companies now adopt it proactively to build competitive advantage:

- Access to more than 1.9 billion Muslim consumers globally (2024);
- Enhanced brand equity and reputation through ethical practices;
- Risk mitigation through halal-compliant supply chains and formulations; and
- Alignment with ESG criteria, particularly in areas such as hygiene, traceability, and animal welfare.

These developments reflect a broader movement toward value-based differentiation and stakeholder-centric governance.

Governance and compliance systems

Effective halal integration requires institutional embedding. Best practices include:

- Including halal objectives in board-level sustainability and risk reports;
- Aligning halal audits with international standards such as ISO 9001, ISO 22000, and ISO 17065;
- Conducting halal due diligence on suppliers, supported by codes of conduct; and
- Treating non-compliance with halal standards as a regulatory and reputational risk.

Halal as an innovation enabler

Strategic halal integration can also drive product and process innovation, including:

- The development of alcohol-free solvents and vegetable-based gelatine alternatives;
- Transparent, digitally managed supply chains to support traceability and consumer trust; and
- Creation of halal-compliant product lines that cater to health-conscious and ethically motivated markets.

These trends support broader sustainability and ethical goals, aligning halal with principles of resource efficiency, responsible production, and Islamic economic values.

Organisational and cultural enablers

Beyond structures and systems, organisational culture plays a critical role. Companies need:

- Awareness and training programmes across functions;

- Cross-functional collaboration between R&D, procurement, quality, and marketing teams; and
- Strategic consultation with halal experts or advisory boards to guide implementation and resolve ambiguity.

In summary, the integration of halal into corporate strategy offers a structured pathway toward competitive advantage, resilience, and alignment with the ethical values of a large and growing global consumer segment.

2.10 Research Gaps and Chapter Summary

This section summarises the key findings of the literature review and links them systematically to the three central research questions (RQ1–RQ3). The primary aim is to identify existing research gaps (Subsection 2.10.1) and critically assess the insights gained from the literature (Subsection 2.10.2). The halal checklist developed in this study forms the conceptual foundation for the five-steps implementation guideline set out in Chapter 6, designed to support halal certification in the chemical–pharmaceutical sector.

2.10.1 Research Gap

The literature review conducted as part of this study clearly reveals several substantive research gaps concerning halal certification in the chemical and pharmaceutical sector. These gaps are directly related to the three guiding research questions and reflect deficits in the translation of religious principles into industrial standards, operational application, and strategic integration.

Lack of systematic translation of religious norms into industrial and technical criteria (related to RQ1)

Although the religious foundations of halal are extensively outlined in Islamic jurisprudence, there remains a lack of methodological frameworks for translating these principles into auditable and technically verifiable standards for industrial production processes. This gap poses particular challenges for countries with predominantly non-Muslim populations, such as Germany (Tieman, 2015; Hassan and Harun, 2018). To date, there is no globally accepted framework that merges core Islamic requirements with regulatory standards specific to the chemical–pharmaceutical sector.

Ongoing uncertainties persist regarding the assessment of critical ingredients such as ethanol, enzymes, genetically modified organisms (GMOs) and animal derived excipients. Partially diverging interpretations among halal certification bodies further complicate this issue, leading to inconsistent certification outcomes and limited implementation reliability. This is especially

problematic in international value chains, where national certification regimes differ in both religious and technical aspects (Zakaria, Musa and Gani, 2019; Rahem, Effendi and Faridah, 2021).

This highlights a core research gap: gaining a clear understanding of the religious, cultural and regulatory requirements for halal certification is a crucial first step, particularly given their complexity. Such understanding provides the necessary foundation for translating these principles into practical and industry-aligned criteria.

Lack of sector specific operationalisation for the chemical and pharmaceutical industry (related to RQ2)

Existing academic literature on halal certification focuses primarily on the food, slaughter and tourism sectors. Empirical studies within the chemical and pharmaceutical domain remain limited and often lack sector specific depth. Consequently, there is little evidence on how German companies implement halal requirements in practice, particularly in relation to organisational structures, staff training, supplier assessment, product formulation and documentation procedures.

Furthermore, limited attention is paid to the challenges faced by export-oriented companies—especially regarding redundant certification requirements, extended approval procedures, and the lack of mutual recognition between halal authorities. Although regulatory systems such as ISO and GMP are widely used, halal principles are rarely embedded into existing compliance structures, resulting in inefficiencies.

Moreover, the implications of halal regulations for export oriented German companies remain insufficiently examined. The absence of harmonisation frequently leads to duplicate certification procedures and delays in market access, posing a significant burden for highly regulated sectors such as the pharmaceutical industry.

At the same time, the halal market is growing rapidly—particularly in Muslim-majority countries—and is becoming increasingly relevant for the chemical and pharmaceutical sector. This development highlights a key research gap: there is limited empirical data on how halal requirements are implemented in practice by German companies, especially regarding internal processes, regulatory challenges, and strategic opportunities in expanding halal export markets.

A further barrier is the lack of a sector-specific reference framework. Companies currently lack systematic and technically operationalised guidance to translate religious principles into compliant industrial practices.

Lack of a sector specific reference framework: Need for a systematic halal guideline for the German chemical and pharmaceutical sector (related to RQ3)

The international halal certification landscape remains highly fragmented, and no unified implementation framework exists that is tailored to the specific needs of the chemical and pharmaceutical industries. While formal standards such as MS 2424 (Malaysia), UAE.S 2055 (United Arab Emirates) and OIC/SMIIC 1 are available, they vary in scope, technical precision and practical relevance. Their compatibility with globally recognised standards such as ISO 9001, ISO 22000 or GMP also remains limited.

For companies, this presents a dual challenge: on the one hand, religious and cultural requirements must be correctly understood; on the other, these requirements must be translated into concrete operational measures—often in the absence of industry specific guidance. The certification approaches currently available are either specific to individual halal authorities, too general, technically insufficient or difficult to integrate into existing compliance and quality systems. The result is a fragmented implementation landscape marked by redundancy and inefficiency.

To date, no instrument exists that systematically translates halal requirements into a format that is auditable, compatible with existing standards, and practical to implement. In addition, the strategic potential of halal, for instance as a driver of innovation or market differentiation, remains largely unexplored in the academic literature.

The universal halal checklist developed in this study, introduced conceptually in this section and presented in detail in Section 2.5, aims to address this gap. It provides the German chemical and pharmaceutical sector with a structured tool based on international best practices, which also serves as the basis for the broader implementation guideline proposed in this dissertation.

2.10.2 Literature Research

This subsection summarises the key findings of the literature review and systematically aligns them with the three research questions (RQ1–RQ3).

Religious, cultural, and legal foundations of halal certification (related to RQ1)

The literature shows that halal is not a universally standardised concept, but a complex system shaped by religious teachings, cultural norms, and national legal frameworks. While the Quran and Sunnah form the religious basis, regulatory interpretations and implementations vary considerably between countries (Mukherjee, 2014; Najmaei *et al.*, 2017; Akram, 2022; Dinar Standard, 2023).

A comparative analysis of five key countries—Malaysia, Singapore, Indonesia, Turkey, and the United Arab Emirates—illustrates these variations. Malaysia and the UAE operate centralised, highly institutionalised certification systems, whereas Indonesia and Turkey rely on more decentralised or dual authority structures. Technical differences appear in several areas, including acceptable alcohol thresholds, sources of enzymes, ritual cleansing, and audit protocols (Noordin, Laila and Samicho, 2014; Tieman, 2015).

Halal governance is also increasingly shaped by geopolitical and economic factors. Certification is no longer seen purely as a religious obligation but is becoming an indicator of quality assurance, market legitimacy, and strategic positioning.

Operational challenges and opportunities in the German chemical-pharmaceutical sector (related to RQ2)

Germany's chemical–pharmaceutical sector enjoys a strong international reputation for innovation and regulatory rigour. However, halal certification has so far played a limited role. Empirical research into practical implementation points to several challenges, especially concerning critical ingredients, documentation procedures, and cleaning standards.

Reported difficulties include the substitution of non-compliant excipients, securing full supply chain traceability, and low awareness of halal-specific requirements among staff and auditors. Diverging interpretations among certification bodies further complicate compliance processes (Najmaei *et al.*, 2017; Fajriyati *et al.*, 2020; Rahem, Effendi and Faridah, 2021).

At the same time, the literature highlights considerable market opportunities—particularly in Southeast Asia, the Middle East, and North Africa. Early integration of halal requirements into strategic planning and compliance systems could enable German companies to expand their market access and improve long-term competitiveness in these fast-growing regions.

Developing a structured and standardised halal implementation framework (related to RQ3)

To address these challenges, this study proposes a universal halal checklist, based on internationally recognised standards such as MS 1500, HAS 23000, GSO 2055, HalMQ, and OIC/SMIIC 1. The checklist consists of 21 control points across five categories: raw materials, logistics, manufacturing, documentation, and biotechnology.

Its purpose is to make halal requirements operationally applicable and auditable, and to align them with existing quality systems, including ISO 9001, ISO 22000, GMP, and HACCP. Rather than replacing existing certification systems, the checklist serves as a foundation for gap analysis and structured integration into current compliance frameworks.

The academic literature emphasises traceability, transparency, and strategic alignment as critical elements of effective halal systems (Kamaruddin *et al.*, 2016; Robaczewska, Vanhaverbeke and Lorenz, 2019). The checklist developed here responds to these requirements and provides a practical, scalable tool for industrial application. Based on this foundation, the study later develops a guideline tailored to the specific needs of the chemical–pharmaceutical sector.

In summary, the literature confirms the need for an integrated halal approach that combines technical feasibility, regulatory alignment, and strategic orientation. Only through such a framework can the full market and innovation potential of halal in the chemical and pharmaceutical industries be realised.

2.11 Conclusion

The literature and regulatory analysis conducted in this study demonstrates that halal certification within the chemical–pharmaceutical sector remains insufficiently explored—particularly with regard to the systematic translation of religious principles into auditable technical criteria applicable in non-Muslim production contexts.

In relation to Research Question 1, a notable gap exists in the derivation and operationalisation of halal principles. The absence of harmonised standards and divergent interpretations among certification bodies continues to impede consistent application in industrial settings.

Regarding Research Question 2, the findings indicate a lack of standardised approaches for implementing globally recognised halal-compliant processes. Moreover, the limited mutual recognition of national certificates significantly restricts export capacities, especially in highly regulated sectors.

Research Question 3 highlights the need for a standardised, sector-specific implementation framework that is compatible with ISO, GMP, and HACCP structures, while also addressing strategic business considerations. Existing halal standards do not yet offer a fully integrated solution in this context.

The halal checklist developed in this study is designed to address these critical deficiencies. Grounded in a comprehensive international benchmark analysis, it operationalises 21 control criteria across five core dimensions: raw materials, logistics, manufacturing, documentation, and biotechnology. As a practical instrument, it supports audits, gap assessments, and the integration of halal compliance into existing quality management and risk control systems.

In this way, the checklist provides both a methodological and strategic foundation for the systematic implementation of halal requirements and contributes to enhancing the international competitiveness of companies operating in the chemical and pharmaceutical sector. The insights derived from the literature review not only define the analytical framework of this research, but also serve as the conceptual underpinning for the empirical investigation and the implementation guideline presented in the subsequent chapters.

This conclusion synthesises the findings from all thematic segments of Chapter 2—including the review of international frameworks, practical challenges, and strategic considerations—and thereby lays the conceptual groundwork for the empirical chapters that follow.

3 RESEARCH METHODOLOGY

3.1 Research Design

This section outlines the methodological and epistemological foundations of the present study. It provides a transparent narrative of the logical connection between the research philosophy, strategy, data collection methods, and the overarching research aim. The chosen approach is grounded in pragmatism and follows a sequential mixed-methods design, combining an in-depth qualitative exploration with subsequent quantitative validation.

3.1.1 Research Philosophy

Understanding the philosophical foundations of research is essential to ensure methodological coherence and meaningful interpretation of data. The chosen research philosophy shapes how knowledge is constructed, interpreted, and evaluated, and thereby informs the research design, data collection, and analysis. This becomes particularly relevant given the multidimensional complexity of the halal concept.

Philosophy offers a conceptual framework for critically examining the nature of reality, knowledge, values, and meaning. It is a continuous process of reflecting on worldviews and engaging with fundamental questions (DeCrescenzo, 1985; Jaspers, 1986; Vogt, 2003). While it may not provide definitive answers (Russell, 1912), philosophy remains intrinsically linked to scientific inquiry and underpins the theoretical orientation of any research project (Steenblock, 2003; Fahrenberg, 2015).

In the context of academic research, three key philosophical dimensions are commonly distinguished:

- Ontology: What can we know, what is reality?
- Epistemology: How can we know reality?
- Axiology: What is the role of values?

These dimensions—sometimes referred to as research paradigms or worldviews (Cresswell, 2009)—determine fundamental methodological and interpretive decisions (Geldsetzer, 2015; Doering and Bortz, 2016). By articulating these positions clearly, researchers enhance the credibility and transparency of their work (Easterby-Smith, Thorpe and Jackson, 2015).

The following content below present the paradigms relevant to this study, focusing in particular on the combined perspectives of interpretivism and pragmatism. These are discussed in terms

of their ontological, epistemological, and axiological assumptions and contrasted with other philosophical positions such as positivism and realism.

3.1.1.1 Conceptual Overview and Philosophical Positioning

This study adopts a dual epistemological framework, combining interpretivism with pragmatic orientation.

Interpretivism holds that reality is socially constructed and subjective, which is particularly relevant to halal certification. Here, definitions and expectations are shaped by cultural, institutional, and individual interpretation (Easterby-Smith, Thorpe and Jackson, 2015; Cresswell and Creswell, 2018). Pragmatism, in contrast, emphasises the usefulness of knowledge for addressing real-world problems. Knowledge is considered valid to the extent that it leads to practical, actionable outcomes (Cresswell and Plano Clark, 2018).

By integrating interpretivist assumptions with a pragmatic orientation, this study explores the subjective, context-bound nature of halal practices while seeking to develop practically applicable guidelines for the chemical-pharmaceutical sector.

To clarify the positioning, key differences between philosophical paradigms are briefly outlined:

- Positivism assumes of an objective, independent reality. Knowledge is generated through observable and measurable facts, while values are to be excluded from the research process. This paradigm is common in the natural sciences but is not applicable in the present study, as the phenomena under investigation are strongly context- and value-dependent;
- Realism also acknowledges the existence of an objective reality but emphasises that this reality can only be accessed through subjective interpretation. Knowledge is therefore theory-laden and shaped by perspective. While realism offers partial relevance, for example in relation to regulatory frameworks, it does not guide the overall approach of this study;
- Interpretivism, a core paradigm of this research, acknowledges that knowledge is socially constructed and value-dependent; and
- Pragmatism focuses on the practical relevance of knowledge and allows for methodological flexibility to address real-world challenges.

The next subsection outlines the dimensions in more detail.

Ontological position

Ontology concerns the question of what exists and the nature of that reality. One's ontological position influences how social phenomena are conceptualised (Gray, 2004; Bryman and Bell, 2011). This study adopts an interpretivist ontological stance. Halal certification is not viewed as an objective, universal norm, but rather as a relational and context-dependent process of negotiation (Fahrenberg, 2015).

Interpretations of halal differ across and within countries depending on the certifying bodies, reflecting institutional, religious, and economic diversity. Halal is therefore treated as a dynamic and socially constructed practice.

Epistemological position

Epistemology addresses how knowledge is generated and validated. This study adopts an interpretivist epistemological stance, where knowledge about halal certification emerges through social interaction, dialogue, and interpretation, rather than through objective measurement alone (Bryman, 2012). Insights are derived from the reflection of individual experiences and organisational practices, captured through in-depth interviews and triangulated with quantitative data.

In-depth interviews allow for the exploration of individual perspectives, while the subsequent quantitative phase serves to validate their relevance and scope. The study emphasises the contextual and subjective character of knowledge.

Axiological position

Axiology explores the role of values in the research process. Within an interpretivist paradigm, research is inherently value-laden. Both researchers and participants bring their own values to the study, which must be actively reflected upon and acknowledged (Collis and Hussey, 2003; Saunders, Lewis and Thornhill, 2009).

This study recognises that religious, ethical, and cultural values are integral to the halal value chain. Decisions regarding the acceptability of certain ingredients (e.g., enzymes, alcohol) vary depending on religious, cultural, and economic perspectives. These complexities are actively considered in the design of research instruments and in the interpretation of findings.

Additionally, a pragmatic axiological dimension is applied. Values not only guide reflection but also act as reference points for assessing the usefulness of the findings. The goal is to develop outcomes that are both culturally appropriate and operationally feasible.

To summarise these positions, the following table compares key paradigms in terms of ontology, epistemology, and axiology, and their relevance to this research.

Table 3-1: Choice of philosophical positions in this research (Rutkowski, 2024)

Paradigm	Ontology	Epistemology	Axiology	Alignment with this study
Positivism	Objective, independent reality	Facts, observation	Value-free	Not applicable
Realism	Reality exists, interpreted	Observable facts, subject to bias	Value-influenced	Partially relevant
Interpretivism	Socially constructed, dynamic	Meaning from experience	Value-laden and	Primary approach
Pragmatism	Context-dependent utility	Mixed sources of knowledge	Practical relevance	Partial support in mixed-method design

Sources: (Saunders, Lewis and Thornhill, 2009; Bryman and Bell, 2011; Gray, 2014; Easterby-Smith, Thorpe and Jackson, 2015)

In conclusion, this study is grounded in an interpretivist research philosophy, enriched by pragmatic considerations. Together, these positions provide a coherent foundation for the mixed-methods research design and support the analytical procedures used in this thesis (Saunders, Lewis and Thornhill, 2009; Bryman and Bell, 2011; Easterby-Smith, Thorpe and Jackson, 2015).

3.1.2 Research Approach

A key component of research design is the selection of an appropriate reasoning strategy—commonly referred to as the research approach. This defines the relationship between theory and empirical reality and determines whether knowledge is generated in a theory-testing (deductive), theory-building (inductive), or iterative (abductive) manner (Saunders, Lewis and Thornhill, 2009; Doering and Bortz, 2016).

In line with the interpretivist and pragmatic orientation of this study, an inductive research approach has been adopted. The aim is to generate novel insights and develop theoretically grounded yet practically applicable recommendations based on empirical data. This approach is particularly appropriate in fields where existing theory is limited.

3.1.2.1 Reasoning Approaches and Inductive Research in this Study

In research methodology, three central forms of logical reasoning are typically distinguished:

- Deduction follows the principle to the data (theory → data) and begins with existing theories or hypotheses, which are then tested against empirical findings. This approach is typical of positivist studies and is not suitable for the present research, as no predefined models or hypotheses are available;
- Abduction moves iteratively between data and theory (data ⇄ theory) to develop plausible explanations for unexpected findings. While abductive reasoning offers supplementary value, it is not central to this study; and

- Induction proceeds from empirical observation to theory (data → theory), generating patterns, categories, and theoretical insights directly from the data. This represents the core logic of the present study.

This study thus follows an inductive logic path, deliberately avoiding the use of predefined hypotheses. Instead, it seeks to develop a deeper understanding of how halal certification is interpreted and operationalised in a sector that has received limited empirical attention to date.

The inductive approach allows for the emergence of a contextualised and grounded understanding of stakeholder perspectives, institutional dynamics, and operational challenges. These insights inform the development of a structured instrument designed to assess the relevance and transferability of the qualitative findings across the wider industry.

This logic supports both the exploratory nature and applied objectives of the study. It is particularly well-suited to culturally and institutionally complex contexts such as halal, where standardised frameworks are lacking and interpretation is shaped by context.

3.1.2.2 Justification for the Inductive Approach

The decision to adopt an inductive research approach is based on the following considerations:

- Limited theoretical basis: In the context of halal certification within the chemical-pharmaceutical sector, few systematised theoretical approaches exist. A theory-building approach is therefore appropriate;
- Complexity of the research subject: The intersection of religious, regulatory, and economic requirements calls for an open, exploratory mode of inquiry;
- Fit with the research objective: The aim of the study is not to test existing theories but to develop contextualised and practical recommendations;
- Sampling strategy: The purposeful selection of experienced actors from the chemical-pharmaceutical industry enables deep insights into real-world practices; and
- Researcher's role: In line with an interpretivist paradigm, the researcher is viewed as an active co-producer of knowledge rather than a detached observer.

The following table summarises the key characteristics of deductive, abductive, and inductive reasoning, and positions their relevance to the present study:

Table 3-2: Comparison of research reasoning approaches (Rutkowski, 2024)

Reasoning Type	Logic	Role of Theory	Typical Application	Relevance to This Study
Deduction	Theory → Data	Test hypotheses	Positivist, explanatory	Not suitable due to lack
Abduction	Data ⇄ Theory	Explore explanations	Iterative, exploratory	Supplementary but not
Induction	Data → Theory	**Build theory**	Interpretivist, exploratory research	**Core approach—supports context-specific**

Sources: *(Saunders, Lewis and Thornhill, 2009; Bryman and Bell, 2011; Gray, 2014; Easterby-Smith, Thorpe and Jackson, 2015)*

In summary, the inductive approach reinforces both the theoretical grounding and the practical relevance of this research. It enables theory-building rooted in stakeholder realities and empirical observation, while remaining open to emergent themes and unanticipated insights—hallmarks of rigorous qualitative research in complex socio-cultural fields such as halal certification.

3.1.3 Research Strategy

3.1.3.1 Case Study Approach

The overarching research strategy adopted in this study is a qualitative case study approach. The aim is to develop a comprehensive, contextually grounded understanding of halal certification practices within the German chemical-pharmaceutical sector. The study does not focus on a single organisation but instead explores the broader institutional, regulatory, and cultural environment in which halal certification is implemented.

Case studies enable in-depth analysis of contemporary phenomena within their natural settings. They are particularly suited to emerging research fields where theoretical frameworks are either fragmented or underdeveloped (Eisenhardt, 1989). Yin further emphasises that case studies are ideal when the boundaries between phenomenon and context are blurred and an exploratory approach is needed to capture complexity.

Stake (Bryman, 2012) highlights that the distinctiveness of case studies lies in their focus on the complexity and uniqueness of each case:

> *"What distinguishes a case study is that the researcher is usually concerned to elucidate the unique features of the case."* (Bryman, 2012).

Case studies are especially valuable when:

- Novel or underexplored questions are addressed (Eisenhardt, 1989);
- Multiple stakeholder perspectives need to be included; and
- The field lacks established theories or models (Stake, in Bryman, 2012)

However, the case study approach also presents certain challenges. Flick (2000) critiques the limited generalisability of single-case analyses. Yin (1994, cited in Gray, 2014) notes that replication or carefully reasoned case selection is required to ensure transferability. Further concerns relate to case selection, the scope of data collection, and ethical considerations (Crowe *et al.*, 2011). Eisenhardt and Graebner (2007) recommend transparent case selection, minimising bias, and building logical, well-supported arguments.

In this study, the German chemical-pharmaceutical industry is conceptualised as a single case. The unit of analysis is not limited to individual companies but includes the broader institutional and sectoral context in which halal certification takes place.

This industry context is characterised by the following features:

- High regulatory requirements;
- Technical production complexity;
- Significant export orientation towards Muslim-majority markets; and
- Multi-layered requirements for product and process design.

This embedded case study design supports a cross-sectional view across organisations and actors while maintaining a clearly defined empirical scope (Yin, 2017).

3.1.3.2 Justification for the Case Study Approach

The choice of a case study strategy is based on the following rationale:

- Philosophical coherence: The interpretivist research orientation and inductive reasoning require a method that allows for contextual depth, value sensitivity, and diverse perspectives;
- Exploratory nature: Halal certification in non-Muslim industrial settings is still under-researched, and foundational insights are needed to inform further theoretical development;
- Sector-specific complexity: The overlap of technical procedures, cultural expectations, and institutional norms calls for a methodology that can capture this multidimensionality;
- Contextual understanding: Case studies enable the investigation of processes, practices, and meanings within their organisational and institutional frameworks;
- Practical relevance: The aim is to produce a practice-oriented guideline for companies that reflects real-world constraints and decision-making contexts; and

- Contribution to theory and practice: While situated in a specific sector, the study seeks to generate insights transferable to other complex, regulated industries.

The following table outlines the core characteristics of the case study strategy and its relevance to this research:

Table 3-3: Choice of research strategy characteristics (Rutkowski, 2024)

Research Strategy	Key Characteristics	Suitability for this Study
Case Study	Qualitative, inductive, focuses on "Why?", "What?", and "How?"; explores contemporary phenomena within their real-life context using multiple sources of evidence	Investigation of halal certification in the German chemical-pharmaceutical sector as a complex, real-world case involving regulatory, technical, and cultural dimensions

In summary, the case study approach is particularly well suited to addressing the research questions of how and why halal certification is interpreted, implemented, and adapted within a complex industrial environment. At the same time, it provides a robust foundation for developing an empirically grounded, context-sensitive framework for practice.

3.1.4 Research Type and Framework

This research adopts an exploratory, pragmatically oriented approach, implemented through a sequential mixed-methods design. The main elements of this framework are outlined below.

3.1.4.1 Philosophical Underpinnings of Pragmatic Mixed-Methods Design research

The methodological approach is based on a pragmatic and exploratory design, integrating both qualitative and quantitative methods. Its philosophical roots lie in classical American pragmatism, particularly the work of Charles Sanders Peirce, William James, and John Dewey:

- Peirce (1878) introduced the pragmatic maxim, arguing that the meaning of a concept resides in its practical consequences introduced the pragmatic maxim, arguing that the meaning of a concept resides in its practical consequences introduced the pragmatic maxim, arguing that the meaning of a concept resides in its practical consequences. For Peirce, knowledge is not an end in itself but is closely linked to action, problem-solving, and observable reality. This view supports a research approach in which theories are judged by their practical relevance and impact. Knowledge, in this sense, is seen as functional and evolving rather than fixed;
- James (1907) built on Peirce's ideas by defining truth as that which "works" in practical terms—that which offers guidance, supports action, and helps solve concrete problems.

Knowledge is seen as a continuous process of adaptation to a changing reality, which resonates with the iterative nature of mixed-methods research;

- Dewey (1938) viewed knowledge as an iterative, experience-based learning process embedded within social and political contexts. Knowledge emerges through interaction with the environment and is shaped by institutions such as education, politics, and the economy. For Dewey, scientific inquiry has an instrumental role: it should address real-world problems and be tested in open, participatory dialogue.

These foundations inform three key methodological principles that underpin both the conceptual and operational framework of this study:

- Knowledge is situated: Knowledge is seen as context-bound and action-oriented. It emerges through engagement with specific problems in defined social, cultural, and organisational settings. In this study, insights into halal certification cannot be separated from the economic, regulatory, and cultural context of the German chemical-pharmaceutical industry. Knowledge creation is therefore relational, dynamic, and application-focused;
- Methods are tools: Methodological choices are guided by utility and suitability for answering the research question. Flexibility and openness in method selection are prioritised. Methods are chosen based on their capacity to address specific research problems, allowing qualitative and quantitative techniques to be combined as complementary tools rather than competing approaches;
- Theory and practice are interlinked: Research is conceptualised as practical, applicable knowledge intended to support decision-making in real-world contexts. Theory serves not as an end, but as a framework for action. In this study, this is reflected in the goal of developing a usable guideline for halal certification that is both empirically grounded and practically relevant. The study aims not only to explain but also to inform change, guide decisions, and reflect operational realities. Research becomes a bridge between understanding and action.

This results in a methodological pluralism that supports the integration of qualitative and quantitative approaches within a coherent and purpose-driven framework. For complex and practice-oriented topics such as halal certification in a non-Muslim industrial setting, this approach is particularly appropriate.

Key contributions supporting this design include:

- Creswell und Plano Clark (2018) argue that integrating qualitative and quantitative components enhances not only the richness of a study, but also its validity, contextual sensitivity, and practical relevance. They advocate for a deliberate and well-structured mixed-methods design, which is better equipped to capture the complexity of social phenomena than single-method approaches. The integration of data sources is essential for producing deeper insights and identifying patterns;
- Morgan (2007) emphasises the iterative and process-oriented nature of pragmatic research, in which qualitative and quantitative phases inform one another in a flexible, non-linear way. He rejects the idea of a single correct method, instead highlighting the importance of meaningful problem-solving, practical relevance, reflexivity, and openness to diverse forms of evidence;
- Shields (1998) applies classical pragmatist principles to public administration and political research, suggesting that pragmatic methodologies are especially suited for generating actionable, participatory, and socially relevant knowledge. Research, in this view, should serve the public good and respond to real-world decision-making challenges. She highlights that in normatively charged or culturally sensitive fields, such as halal certification, pragmatism offers a framework for generating insights that are both scientifically rigorous and ethically reflective.

3.1.4.2 Pragmatic Implementation – Exploratory Mixed-Methods Approach

Building on the epistemological foundations of pragmatism outlined in 3.1.4.1, this study employs a sequential mixed-methods design. This enables a structured combination of qualitative depth and quantitative generalisability, reflecting both the interpretive complexity and the applied ambition of this research.

Exploratory focus

The exploratory nature of this dissertation is driven by the limited and inconsistent body of knowledge on halal certification in non-Muslim industrial environments. While food-related halal studies are relatively common, the chemical-pharmaceutical sector remains underexplored. Regulatory ambiguities, interpretive variation across certification bodies, and lack of implementation guidance have left a notable empirical and conceptual gap, particularly for European producers like those in Germany.

Accordingly, the present research pursues three central objectives:

- To capture stakeholder interpretations and experiences: In-depth interviews with decision-makers, managers, and further experts were conducted to gain a

contextualised view of how halal principles are interpreted and implemented, or avoided, in practice. This includes not only formal certification processes, but also informal practices, knowledge gaps, and internal resistance;

- To examine structural, regulatory, and institutional barriers: Halal certification is not only a technical challenge but also a regulatory and cultural one. This study investigates the lack of harmonisation between national halal standards, the insufficient institutional infrastructure in Germany, and the limited cross-recognition of halal certificates, all of which constrain export potential and contribute to uncertainty among producers;
- To identify emerging narratives and strategic positioning: The study looks beyond compliance and explores how halal is used strategically, for example, as a differentiation tool, as part of broader ESG or sustainability agendas, or as a response to evolving consumer expectations in Muslim-majority markets.

This openness to interpretation and contextual understanding is methodologically necessary. The topic is cross-disciplinary, shaped by religious ethics, regulatory practice, corporate strategy, and international trade dynamics. A narrow hypothesis-testing design would not be adequate to capture this complexity.

Mixed-methods integration (qual → quant)

The implementation of the mixed-methods design followed a two-phase sequence:

- Qualitative phase: Exploratory interviews (n=14) with industry representatives from Germany's chemical and pharmaceutical sector were conducted to build an empirical foundation. Thematic analysis was used to identify recurring patterns, challenges, and context-specific interpretations of halal certification; and
- Quantitative phase: The second phase consisted of a sector-specific internet questionnaire (n=587), distributed to employees across the German chemical-pharmaceutical industry. The instrument operationalised key themes from the interview phase, allowing for quantitative validation pattern identification.

This design ensures that the quantitative component is grounded in actual practice, increasing its relevance and resonance within the field.

Triangulation and validation assurance

To reinforce methodological robustness, a threefold triangulation strategy was employed:

- Data triangulation: Interview and internet questionnaire data were compared systematically to identify both convergent themes and outlier positions;

- Methodological triangulation: The integration of narrative-based qualitative data with structured quantitative analysis provided a multi-angled view of the research questions; and
- Findings triangulation: All data were analytically aligned with the central research questions (RQ1–RQ3), ensuring coherence across design, data, and interpretation.

Flexibility and practical relevance

A final feature of the pragmatic approach is methodological adaptability, reflected in the following ways:

- Interview protocols were revised after initial pilot interviews to reflect industry-specific vocabulary and deepen thematic insight;
- The internet questionnaire instrument experienced iterative piloting, including validation for technical and regulatory accuracy; and
- Analytical categories and interpretation frameworks were reviewed and refined to ensure their practical relevance for application.

The outcome of this research, a halal certification guideline for the German chemical and pharmaceutical sector, is both conceptually sound and practical in its application. It is intended to help companies meet complex halal requirements while avoiding the creation of separate or duplicate systems.

3.1.5 Research Choice

The following subsections explain the rationale and structure of the mixed-methods strategy applied in this study. They outline the conceptual foundations, the sequential design logic, and the methodological justifications for combining qualitative and quantitative approaches.

3.1.5.1 Overview: Mixed-Methods Strategy

In this study, mixed methods are understood as the purposeful combination of qualitative and quantitative data collection and analysis within a unified research design. The aim is to develop a comprehensive and practice-oriented understanding of halal certification in the German chemical-pharmaceutical sector.

This design is particularly suitable when both the subjective depth of individual experience and the general patterns within a sector must be captured. For example, Mertens (2015) views mixed methods as a tool for promoting social change, while Creswell (2009), Johnson and Onwuegbuzie (2004), and Tashakkori and Teddlie (1998) focus on its procedural application.

Creswell (2009) highlights the importance of collecting, analysing, and combining data sets systematically. Johnson and Onwuegbuzie (2004) define mixed methods as research that combines various techniques and paradigms to answer complex questions. Tashakkori and Teddlie (1998) describe mixed methods as research that employs both qualitative (QUAL) and quantitative (QUAN) approaches at different stages.

Patton (2001) and Kelle (1994) argue that this combination enhances the breadth and depth of research findings. According to Tashakkori and Teddlie (2009), the mixing of methods can occur at any phase of the research. Zait and Zait (2009) also advocate for methodological flexibility tailored to the research question.

The success of mixed methods in management and organisational research is supported by studies from Becker and Sempik (2008), Creswell and Plano Clark (2018), Bryman *et al.* (2008), and Saunders, Lewis and Thornhill (2009).

In this study, mixed methods serve as a pragmatic and structured toolset to analyse the complex and under-researched field of halal certification from multiple perspectives.

3.1.5.2 Mixed-Methods Integration: Sequential Design

This research uses a sequential exploratory design, in which the qualitative phase precedes the quantitative one. This approach is appropriate for exploratory studies where context-specific insights are needed first to inform scalable tools.

The study followed two consecutive phases: Qualitative and quantitative phase (see 3.4.1.2). Creswell und Plano Clark (2018) highlight that this sequence is especially effective when inductively derived insights are to be translated into structured, testable instruments. This is well-suited to fragmented fields such as halal certification in non-Muslim contexts.

The sequential structure allows a multi-layered view: qualitative methods explore individual interpretations, while quantitative methods identify sector-wide trends. This combination supports triangulation and consistency across findings (Flick, von Kardoff and Steinke, 2004).

3.1.5.3 Justification for Mixed Methods Choice

The decision to apply a mixed-methods design is informed by both methodological pragmatism and strategic-conceptual considerations. It is a choice shaped by the research questions, the complexity of the sector, and the study's epistemological orientation. Specifically, the following arguments support this approach:

- Philosophical coherence: The mixed-methods strategy aligns with the study's pragmatic, action-oriented logic of inquiry. Methods are seen as tools to solve practical problems and are selected based on relevance and utility;
- Exploratory logic: The sequential structure allows for emergent themes to be explored qualitatively and then tested quantitatively (Johnson and Onwuegbuzie, 2004; Cresswell and Plano Clark, 2018). This iterative process ensures empirical depth and relevance;
- Sectoral complexity: The chemical-pharmaceutical industry is shaped by diverse technical, regulatory, and cultural demands. Addressing this multidimensionality requires an analytical design that can capture such complexity from multiple angles. A single-method approach would likely overlook key dynamics;
- Enhanced validity: Methodological triangulation strengthens the robustness of findings by cross-validating emergent patterns and contextual insights (Bryman and Bell, 2015);
- Practical application: The combination of qualitative depth with quantitative scope supports the development of an applied outcome—a practical halal guideline checklist, designed as a strategic tool for companies.

This approach enables a holistic analysis, connecting personal perspectives with institutional and market-level factors. Such integration is critical for producing evidence-based, usable recommendations that reflect both practice and theory.

The process is summarised in the figure below.

Figure 3-1: Sequential mixed-methods strategy — from qualitative exploration to quantitative validation (Rutkowski, 2024)

3.1.6 Time Horizon

3.1.6.1 Overview: Cross-Sectional Time Horizon

The term time horizon refers to the temporal scope of data collection within a research study. A key distinction is made between longitudinal and cross-sectional research designs—an aspect that, according to Saunders, Lewis, and Thornhill (2009), is independent of the underlying philosophical orientation of the research.

A longitudinal design involves repeated data collection over an extended period and enables the analysis of trends, developments, and changes over time (Gray, 2004; Bryman, 2012). The focus is on observing temporal dynamics and long-term processes.

In contrast, a cross-sectional design collects data at a single point in time or within a defined time frame. Its aim is to identify relationships, patterns, and variations at a given moment, without tracking changes over time (Saunders, Lewis and Thornhill, 2009).

3.1.6.2 Justification for Cross-Sectional Approach

For this study a cross-sectional design was chosen. The research focuses on a specific phenomenon, halal certification in the German chemical-pharmaceutical sector, and collects data within a clearly defined time window. Bryman and Bell (2015) note that cross-sectional studies are well suited to analysing variation across cases using standardised methods.

In the qualitative phase, in-depth interviews offered detailed insights into participants' experiences, motivations, and interpretations of halal certification. These included individual perspectives, institutional constraints, and organisational routine.

In the quantitative phase, standardised questionnaires were used to assess behavioural patterns, levels of awareness, and general attitudes toward halal compliance. The objective was to identify sector-wide tendencies and the key factors shaping implementation practice.

A longitudinal approach was deemed unsuitable, as the aim of the study was not to examine change over time, but rather to conduct a focused analysis of current practices, challenges, and perceptions. Furthermore, a cross-sectional design offers practical advantages, particularly in terms of time and resource efficiency (Saunders, Lewis and Thornhill, 2009; Gray, 2014).

3.2 Sampling Strategy and Data Collection

To ensure practical applicability, the development of the guideline for the German chemical-pharmaceutical sector is based on both an extensive literature review and empirical fieldwork. Empirical data were collected through a mixed-methods design, combining qualitative in-depth interviews with a supplementary internet questionnaire. This triangulated approach ensures a robust empirical foundation, enhancing both theoretical grounding and sector-specific relevance.

3.2.1 Qualitative Phase: Design and Data Collection through In-Depth Interviews

3.2.1.1 Sampling Strategy and Rationale

Participants were selected through purposive sampling, based on clear inclusion criteria aligned with the study's aims. The objective was to include individuals with substantial industry experience and specific knowledge of halal certification processes. Included criteria are:

- International experts: Only experts in senior positions, working at an international level with a global understanding of higher-level processes, were selected;
- Leadership roles: Participants occupied leadership roles and directly influenced strategic decisions within their organisations, ensuring that the insights gained were of a strategic nature and illuminated organisation-wide implications;
- Long-standing company affiliation: At least five years of organisational experience ensured a deep understanding of internal processes and challenges in standard implementation; and
- Strategic and operational expertise: Participants had a comprehensive view of both organisational and strategic implications.

At the beginning of each interview, participants were asked to describe their roles and responsibilities within their organisation. Based on their responses, they were categorised into two groups:

- Top-level managers, including Chief Executive Officers (CEOs), Chief Operations Officers (COOs), Senior Vice Presidents (SVPs), and Vice Presidents (VPs); and
- Senior managers, comprising department heads, directors, and staff function leaders who were responsible for translating corporate strategy into operational actions.

The targeted recruitment of highly qualified professionals aimed to generate sector-specific, practice-oriented insights into attitudes, motivations, and challenges related to halal certification (Collis and Hussey, 2003). Care was taken to avoid religious bias, with a strict focus maintained on operational and strategic dimensions.

The choice of in-depth interviews as the primary qualitative method was deliberate and grounded in several considerations:

- Detailed exploration: In-depth interviews enabled the examination of complex and sensitive issues related to halal practices. Interviewers could probe further, clarify meaning, and adapt to emerging themes in real time;

- Flexibility and responsiveness: The format allowed spontaneous adjustment to follow unanticipated but relevant discussion points;
- Confidentiality fostering openness: The face-to-face setting offered a secure environment in which participants felt able to speak candidly, essential given the sensitivity of the subject; and
- Rich, individualised perspectives: The method captured in-depth, nuanced insights from decision-makers that standardised questionnaires would not have been able to extract.

Given these strengths, in-depth interviews were considered the most appropriate method for investigating the complex strategic and operational dimensions of halal certification in the chemical-pharmaceutical industry.

3.2.1.2 In-Depth Interview Design and Implementation

The qualitative data were collected through semi-structured, in-depth interviews using open-ended questions, allowing for a detailed exploration of participants' experiences, beliefs, and values (Legard, Keegan and Ward, 2003; Irvine, 2011; Block and Erskine, 2012). According to Qu and Dumay (2013), in-depth interviewing requires the researcher to act as both an empathetic listener and a neutral facilitator.

The interviews were conducted:

- Exclusively in German; and
- Eleven interviews were held face-to-face, with three conducted by telephone.

The interview questions were developed in German and structured to be semi-guided yet open-ended, encouraging participants to offer detailed and reflective responses. This format allowed for flexibility and responsiveness, enabling the exploration of unanticipated but relevant topics as they emerged during the conversation.

Each participant received a Participant Information Sheet (PIS) and a Consent Form in advance, ensuring:

- Clear understanding of the research aims;
- Transparency around data handling in line with GDPR requirements; and
- Fully informed consent and guaranteed anonymity.

Potential participants were contacted at least one week before the planned interview and were given seven days to confirm their participation. Consent was a prerequisite for participation.

The PIS provided key details, including:

- Data protection and privacy measures;
- Compliance with GDPR and UoW ethical guidelines;
- Voluntary participation; and
- Assurance of full anonymity throughout the research process.

In total, 14 participants were interviewed, with an even split between the chemical and pharmaceutical sectors. The sample was also balanced in terms of organisational hierarchy, including both top-level and senior management representatives. This ensured that the findings reflect a broad range of strategic and operational viewpoints within the industry.

3.2.1.3 In-Depth Interview Guide and Questions

The in-depth interviews began with two introductory questions focused on participants' professional backgrounds and their own interpretations of the term halal. These opening questions provided essential context and helped frame subsequent discussion.

The main part of the interview was structured into six thematic parts, comprising a total of 19 questions (see Appendix 7.3.1 for the complete interview guide). These parts focused on the following core topics:

- The importance of halal certification for Muslim consumers, including the influence of religion, cultural backgrounds, and other contributing factors;
- The strategic relevance of halal certification for chemical-pharmaceutical companies, its impact on long-term strategic planning, and organisational responses;
- An analysis of the benefits and challenges of implementing halal certification, the potential effort involved, major obstacles, and strategies to overcome these barriers;
- The integration of Muslim cultural values, market needs, and the importance of a holistic understanding of halal certification in corporate strategy;
- Operational complexities, process challenges, and the role of digital tools in achieving halal certification; and
- The development of comprehensive halal certification recommendations for chemical-pharmaceutical companies, including challenges, solutions, and impacts on the primary Muslim target group.

The interview concluded with a reflective question, asking participants whether the discussion had provided new insights for themselves or their organisation, and whether they identified any unresolved issues.

The semi-structured format allowed the interviewer to follow a consistent structure while retaining the flexibility to explore unanticipated yet relevant topics (Easterby-Smith, Thorpe and Jackson, 2015). This approach supported a deeper understanding of participants' perspectives and ensured that emerging themes could be explored in detail.

Each interview lasted approximately one hour. Arranging and conducting these interviews posed logistical challenges, as most were held face-to-face and required significant travel. Three interviews were conducted by telephone to accommodate availability constraints. Nevertheless, data collection was completed after 14 interviews, as thematic saturation had been reached and no substantially new information was emerging (Flick, 2000).

3.2.1.4 Pilot Study and Adjustment

As part of the research preparation, a pilot study was conducted to test the clarity and effectiveness of the in-depth interview questions. The aim was to ensure that the questions were easy to understand, relevant to the study objectives, and able to generate meaningful insights into the halal certification landscape within the chemical-pharmaceutical sector.

A total of 12 selected experts took part in the pilot study, evenly split between the chemical and pharmaceutical industries. All participants had extensive industry experience and gave valuable feedback. Each session, which involved reviewing the question blocks and discussing their content, lasted around 10 to 15 minutes and was conducted face-to-face. Notably, six of these participants later took part in the final interviews.

The pilot focused on three main thematic areas:

- Halal certification and its relevance for the German chemical-pharmaceutical industry: Participants discussed its role in Islam, its practical importance in the German context, and challenges such as divergent interpretations between Muslim and non-Muslim respondents, as well as cultural sensitivities;
- Certification standards and holistic understanding: This part examined the certification process in detail and highlighted potential biases and differences in how participants understood halal requirements; and
- Implementation approach: Participants reflected on opportunities and challenges in developing a comprehensive market model. However, limited prior experience and familiarity with the topic made in-depth analysis more difficult.

Several issues were identified during the pilot:

- Some questions were unclear, particularly in relation to the perspective from which they should be answered (German vs. global). These questions were reworded, shortened, and simplified to improve clarity;
- Technical terms and detailed religious references were removed to maintain the focus on strategic and operational aspects;
- Questions that were not central to the research aims, especially those requiring in-depth Islamic knowledge, were either revised or omitted; and
- Superficial answers to complex questions revealed a need for clearer phrasing and more practical, business-focused examples to guide responses.

In addition, the online questionnaire was technically improved to ensure mobile compatibility and a smoother user experience.

The feedback confirmed that the final versions of both the interview guide and the online questionnaire were clear, easy to follow, and well aligned with the professional backgrounds of the target group. These adjustments helped ensure that participants could reliably represent their company's perspective and contribute valid and useful insights (Hemmerich, 2021).

3.2.1.5 Participants (QUAL)

In total, 14 senior and top-level managers from the chemical and pharmaceutical sectors participated in the qualitative phase of this study. Semi-structured interviews were used to collect rich, contextual insights into the operational, regulatory, and cultural dimensions of halal certification within the German chemical-pharmaceutical industry.

The Table 3-4 provides an overview of participant characteristics and interview-specific metrics. It includes the following aspects:

- Sector affiliation (chemical or pharmaceutical), ensuring coverage of both relevant industrial contexts;
- Organisational hierarchy, with participants classified as either senior or top-level managers, thus ensuring strategic-level insight;
- Demographic information, including age group;
- Interview duration, serving as an indicator of engagement depth;
- Mode of interview, with most conducted face-to-face (n=11), and a minority by phone (n=3), supporting flexibility while maintaining depth;
- Transcript word count, capturing the total length of each interview and the number of words spoken by each participant; and

- Participant share (%), indicating the proportion of the transcript attributed to the interviewee, reflecting the balance of dialogue.

Table 3-4: Overview of interview participants – sector, role, and interview metrics (Rutkowski, 2024)

Participant	Sector	Hierarchy	Age	Lenghts [hours]	Way	No. of words total	Share Participants	No. of words participant
1	pharmaceutical	Top-level Manager	40 - 50	00:49:12	face-to-face	6,403	66%	4,220
2	chemical	Senior Manager	40 - 50	01:05:11	face-to-face	7,618	69%	5,221
3	pharmaceutical	Senior Manager	40 - 50	01:05:37	face-to-face	8,697	58%	5,041
4	chemical	Top-level Manager	50 - 60	01:00:04	face-to-face	8,271	75%	6,214
5	pharmaceutical	Top-level Manager	40 - 50	00:58:07	face-to-face	7,815	67%	5,213
6	pharmaceutical	Senior manager	50 - 60	01:15:34	face-to-face	9,672	81%	7,879
7	chemical	Senior manager	40 - 50	01:01:58	by phone	6,874	71%	4,864
8	chemical	Senior Manager	40 - 50	00:50:08	face-to-face	7,053	66%	4,678
9	pharmaceutical	Senior Manager	50 - 60	01:05:32	by phone	8,307	59%	4,886
10	pharmaceutical	Top-level Manager	40 - 50	00:41:10	face-to-face	5,446	53%	2,865
11	chemical	Senior Manager	40 - 50	00:57:01	face-to-face	7,227	69%	5,000
12	chemical	Top-level Manager	50 - 60	00:41:08	face-to-face	5,440	69%	3,759
13	pharmaceutical	Senior manager	40 - 50	01:05:54	by phone	6,371	66%	4,183
14	chemical	Top-level Manager	40 - 50	00:42:10	face-to-face	5,429	67%	3,641
				00:57:03		**7,187**	**66.8%**	**4,833**

The average interview lasted approximately 57 minutes, with participants contributing an average of 4,833 words, representing 66.8% of the total transcript content. These figures reflect a high level of engagement and confirm the depth of empirical material suitable for robust qualitative analysis.

While most interviews were conducted in person to support richer interaction, three took place by phone. This hybrid format enabled access to a broader range of experts without compromising the quality of the data.

The sample was balanced across both sectors, capturing a variety of organisational contexts. It also included a range of functional roles, which strengthened the transferability and internal diversity of the findings.

Overall, the composition and structure of the participant group were well aligned with the exploratory and practice-focused aims of this research. The interview data provided a solid empirical foundation for the subsequent coding, thematic analysis, and development of the sector-specific halal implementation framework presented in the following subsections.

3.2.2 Quantitative Phase: Design and Data Collection through Internet Questionnaire

3.2.2.1 Sampling Strategy and Rationale

For the quantitative phase, a random sampling strategy was employed. Employees from the chemical-pharmaceutical sector were invited to participate, provided they were professionally affiliated with the industry and gave informed consent in accordance with GDPR and ethical

guidelines. This approach ensured broad representativeness, giving all eligible individuals an equal chance of participation. It also helped minimise bias and enhance the generalisability of the findings.

With a final sample of over 500 participants—consistent with recommendations in the literature—a solid basis for statistically meaningful analysis was established (Jacob, Heinz and Decieux, 2013).

To complement the qualitative findings and allow for a more differentiated analysis, the internet questionnaire collected data on the following:

- Sector affiliation: Chemical or Pharmaceutical;
- Current job title: Manager, Specialist, Intern, or Other; and
- Organisational department: Customer Service, Management, Marketing and Sales, Production, Procurement, Research and Development / Application Engineering, Supply Chain / Logistics, or Other.

3.2.2.2 Questionnaire Design and Implementation

A structured internet questionnaire was used in the quantitative phase to validate the qualitative findings. Standardised questions, primarily in multiple-choice format, were used throughout. In addition, three open-ended questions allowed participants to express their personal views. The internet questionnaire was available in both German and English.

Participants received an information sheet (PIS) and consent form in advance, which explained:

- The handling of personal data in accordance with GDPR and University of Worcester (UoW) guidelines;
- The purpose of the research and why the specific target group was approached;
- The voluntary nature of participation, guaranteeing complete anonymity;
- An overview of the questionnaire content and an estimated completion time (~6–7 minutes); and
- Further information about the research organisation, supervisors, and contact details at UoW for any queries.

The questionnaire was accessible via desktop and mobile devices, ensuring technical flexibility. To protect data integrity, only one submission per device was permitted. Participants could also provide their email address voluntarily if they wished to receive study results, fully compliant with GDPR.

Internet-based questionnaires offer advantages such as cost-effectiveness, wide geographic reach, and fast data collection. However, they also present limitations, including varied reading comprehension and the absence of non-verbal cues (Bryman, 2009; Doering and Bortz, 2016).

3.2.2.3 Questionnaire Structure and Items

The questionnaire was largely composed of standardised, closed-ended questions, including Likert-scale and multiple-choice items. These were supplemented by three open-ended questions to allow for more personal input (see Appendix 7.3.2). Providing the questionnaire in both German and English enhanced accessibility and improved the overall response rate.

The content of the questionnaire was organised around key thematic areas relevant to the research objectives. These included:

- Definition and significance of halal certification;
- Halal certification factors;
- Halal market and its impact;
- Certification importance and effort;
- Halal certification processes; and
- Holistic understanding.

It is important to note that although a comprehensive range of questions was included to cover these thematic areas, only those items directly related to the central research questions were selected for the final analysis. Items that did not align closely with the core focus of the study were excluded to maintain the analytical precision and relevance of the results.

3.2.2.4 Pilot Study and Instrument Refinement

A pilot study was conducted to test the clarity, user-friendliness, and relevance of the questionnaire. Ten participants took part—seven from the chemical-pharmaceutical industry (two of whom were later interviewed qualitatively) and three from other sectors. They represented a variety of organisations.

Participants completed the questionnaire under realistic conditions, reviewing both the content and technical aspects such as usability and loading speed. Each participant provided feedback on question clarity, structure, and interface. The pilot was conducted in two rounds over one week, with improvements made after each.

Key feedback and resulting changes included:

- Clarity: Some items, especially those in the second part relating to Muslim-specific factors, were unclear. These were simplified and reworded to focus on the German market. Overly technical terms (e.g., references to DIN ISO 9001) were removed or generalised. Additional instructions were added to improve context;
- Content focus: Questions unrelated to the research objectives, particularly those concerning general halal market evaluations, were removed;
- Response options: Overly complex multiple-choice items were reduced. For example, a five-option question was reformulated into a clearer Yes/No format; and
- Technical performance: Issues such as slow page loads and formatting problems were corrected, font styles were standardised, and mobile usability was improved.

These improvements ensured that the final questionnaire was technically stable, easy to navigate, and closely aligned with the research objectives. Feedback indicated that the adjustments enhanced both the participant experience and the quality of the data.

3.2.2.5 Participants Response Rate and Statistics

In total, 1,489 individuals accessed the online questionnaire. Of these, 587 participants (39.4%) completed it in full. The remaining 902 partial responses (60.6%) were excluded from analysis. The final sample of 587 complete responses formed the empirical basis for the quantitative results.

Sector distribution was nearly equal: 297 respondents (50.6%) came from the chemical sector, and 290 (49.4%) from the pharmaceutical sector, allowing for balanced analysis.

To capture organisational diversity, participants were asked to indicate both their job title and departmental affiliation. Job titles were classified into four categories: manager, qualified specialist, trainee, and other. In the chemical sector, 46% of respondents identified as managers and another 46% as qualified professionals. By contrast, in the pharmaceutical sector, a larger share of 54% were qualified professionals, while the proportion of managers was lower at 35%. Trainees and other categories together accounted for less than 10% in both sectors.

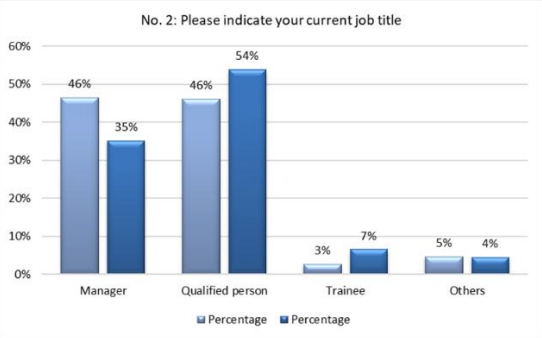
A more detailed perspective was gained through an analysis of departmental affiliation. In the chemical sector, the largest proportion of respondents of 34% worked in production, compared to 21% in the pharmaceutical sector. Other departments, such as marketing and sales, research and development (R&D), and supply chain management, were more evenly represented across both sectors. Notably, customer service roles were more prevalent in the pharmaceutical sector

(13% compared to 5%), whereas supply chain/logistics functions were slightly more represented in the chemical sector (13% compared to 10%).

Gender distribution: In the chemical sector, 66% of respondents identified as male, 33% as female, and 1% as diverse. In the pharmaceutical sector, the gender distribution was more balanced, with 53% male, 46% female, and fewer than 1% identifying as diverse.

The table and figures below summarise the key characteristics of the internet questionnaire participants across both sectors, role and functional area composition.

No. 1	Amount	Percentage
Chemical sector	297	50.6%
Pharmaceutical sector	290	49.4%
	587	**100%**



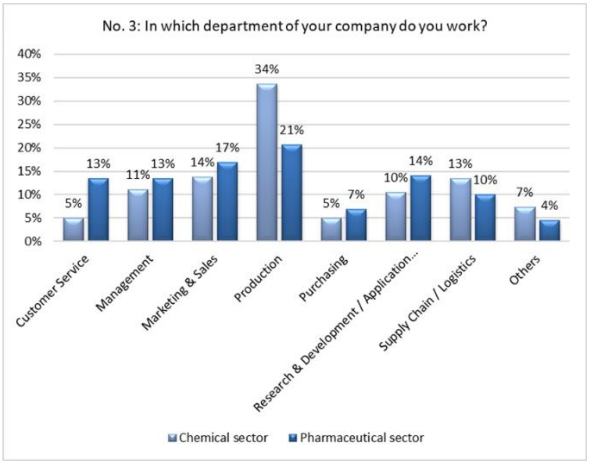


Figure 3-5: Overview of questionnaire participants – sector affiliation, role, and functional characteristics (Rutkowski, 2024)

With a sample of 587 valid responses, evenly distributed across both sectors and organisational roles, the quantitative dataset provides a strong empirical basis. The diversity in departments and gender supports analytical depth and transferability. This quantitative phase complements the qualitative findings, enabling a more comprehensive view of halal certification awareness, perceptions, and challenges across the German chemical-pharmaceutical industry.

3.3 Data Quality Assurance and Data Analysis

Ensuring validity, reliability, and trustworthiness was another concern of this study. Building on the data collection methods described in Section 3.2, this section outlines the structured approach to quality assurance and data analysis used in both the qualitative and quantitative phases. Particular attention was given to methodological transparency, researcher reflexivity, and triangulation to ensure academic rigour and practical relevance.

3.3.1 Analytical Framework

The analysis followed a pragmatic mixed-methods philosophy, combining interpretative depth with empirical breadth. This approach enabled the integration of rich qualitative insights from

the in-depth interviews with broader patterns derived from the internet questionnaire, supporting both contextual sensitivity and practical relevance.

The analytical framework was guided by the four trustworthiness criteria proposed by Lincoln and Guba (1985), each aligning with established quality standards in quantitative research:

- Credibility (internal validity) was ensured by closely aligning the findings with participants' perspectives. This was achieved through methodological triangulation, combining insights from in-depth interviews and internet questionnaire data;
- Transferability (external validity) was supported through purposive sampling across both industry sectors and organisational levels, resulting in a diverse and context-rich dataset. Thick descriptions of the study context and participant characteristics enable readers to assess the relevance of findings for other settings;
- Dependability (reliability) was achieved through systematic and transparent documentation of all analytical procedures. Coding structures, thematic development, and methodological decisions were recorded in detail to ensure traceability and reproducibility; and
- Confirmability (objectivity) was maintained through continuous researcher reflexivity. Reflective memos and process documentation helped separate personal assumptions from data interpretation—especially important given the cultural and religious sensitivity of the topic.

To support credibility, the research design used an indirect form of respondent validation by linking key interview themes to internet questionnaire questions. This helped ensure that participants' perspectives were broadly reflected and created coherence between the qualitative and quantitative phases.

Transferability was supported through purposive sampling across different sectors and organisational roles, resulting in a diverse and context-rich dataset. At the same time, dependability and confirmability were strengthened by clearly documenting the analysis process and maintaining ongoing researcher reflexivity throughout the study.

The data analysis followed established principles of thematic analysis, drawing on Braun and Clarke's (2013) methodological guidance. Further support was provided by Flick (2005) and Bryman (2015), particularly with regard to transparent coding procedures and the integration of qualitative and quantitative strands within a mixed-methods framework.

The empirical basis included 14 semi-structured expert interviews and 587 valid questionnaire responses.

This dual approach offered:

- Exploratory depth, through rich, context-specific narratives provided by senior industry professionals; and
- Empirical breadth, by validating sector-wide perceptions and practices via large-scale quantitative data.

Methodological triangulation allowed for systematic integration of both data streams, reinforcing coherence and enhancing relevance. Integration was operationalised through thematic alignment, a coding framework mapped to the three central research questions (RQ1–RQ3).

3.3.2 Measures to Ensure Data Quality

To ensure the quality and trustworthiness of the data, a range of quality assurance measures was applied throughout both the qualitative and quantitative phases.

Pilot studies were conducted for the interview guide and questionnaire (3.2.2.4). Twelve industry experts from both sectors tested the interview guide for clarity and relevance. Ten participants tested the questionnaire for usability and language (Doering and Bortz, 2016). Feedback led to clearer language, simplified instructions, removal of unnecessary technical content, and adjustments to response scales.

Strict anonymisation procedures were followed to protect participant confidentiality, in line with GDPR and institutional ethical guidelines (RatSWD, 2017). Personal data were removed during transcription and data entry. In the internet questionnaire, IP addresses were not stored, and only one response per device was allowed to maintain data integrity.

Data cleaning was performed systematically. In the qualitative phase, irrelevant text was excluded. In the quantitative phase, 902 incomplete responses (60.6%) were removed. Open-ended comments were screened, and inappropriate content deleted.

Researcher reflexivity was addressed through critical self-reflection and a documented audit trail. Given the topic's sensitivity, religious interpretations were avoided, and emphasis was placed on operational and strategic aspects (Gray, 2004; Oliver, 2010).

All coding and analysis steps were documented. A codebook was developed for the qualitative phase, covering each step from initial coding to theme development. In the quantitative phase, links between codes, internet questionnaire items, and research aims were clearly mapped.

Together, these procedures ensured methodological rigour and the robustness of findings.

3.3.3 Qualitative Data Analysis

All interviews were transcribed in German and anonymised. Coding was performed manually using Microsoft Word and Excel, following an inductive, bottom-up approach. No predefined categories were used, and codes and themes emerged from the data.

To improve transparency and comparability, the coding was supported by a structured evaluation framework (see Appendix 7.4.1 and 7.4.2). Each code was assigned a relevance score from 1 (not important) to 4 (very important), based on a four-level assessment matrix. This allowed for semi-quantitative prioritisation of themes and facilitated the identification of dominant patterns across participant groups and sectors.

The evaluation used symbols and numeric values to reflect the perceived significance of each category, enabling direct comparison between responses and averaging across sectors.

Codes were refined and grouped into broader themes, each linked to one or more of the three research questions:

- RQ1: Religious, cultural, and regulatory requirements for halal certification;
- RQ2: Strategic challenges and opportunities for German manufacturers; and
- RQ3: Development of systematic implementation guidelines.

The coding process involved repeated review, refinement, and reorganisation of codes to form clear thematic clusters. The final themes captured key aspects of the research topic and were each linked to one or more of the main research questions. Thematic areas included:

- Interpretations of halal, focusing on religious foundations (e.g., Islam, Quran), food-specific aspects (e.g., animal-derived ingredients), community norms, and interpretive flexibility;
- Cultural and social context, including motivations for halal consumption, value systems, national differences, and personal identity;
- Strategic implications, covering business relevance, market differentiation, and organisational responses;

- Certification standards, addressing both the perceived benefits and the implementation effort, along with suggestions for improvement;
- Holistic perspectives, which examined how halal principles are integrated into corporate strategy, vision, and market positioning;
- Processes concerning regulatory complexity, national adaptations, and the role of digital tools in supporting implementation; and
- Opportunities and barriers, such as competitive advantages, resource constraints, ambiguity, and the interpretability of certification criteria.

The results of the scoring procedure are summarised in a coding matrix, which presents the theme-specific average values across all participants. These values were used to identify which aspects were seen as particularly relevant and informed both the quantitative questionnaire design and the key findings in Subsection 4.3.3.

This coding logic also underpins the triangulation in Chapter 5, where thematically dominant patterns are brought into dialogue with quantitative data.

The resulting coding framework forms the analytical foundation for the empirical results. The systematic linkage between codes, themes, and research questions ensures internal consistency and transparency in interpreting the findings. An overview of codes, categories, and scoring logic is provided in Appendix 7.4 and referenced throughout Subsection 4.3.

3.3.4 Quantitative Data Analysis

The aim of the quantitative analysis was to systematically examine the themes identified in the qualitative phase and assess their relevance across a broader industrial context. The questionnaire was developed in line with the central research questions and designed to capture key dimensions of halal certification directly.

While some items were informed by themes from the interview coding, especially those rated with high relevance (levels 3 or 4), most questions were not directly based on the qualitative data. Instead, they were developed to provide a more direct response to the three research questions (RQ1 to RQ3).

Over the course of the project, the research questions were refined or adjusted. As a result, not all questionnaire items were included in the final analysis. However, this did not compromise the exploratory character of the study.

Qualitative insights were translated into measurable items to enable an operationalised approach to data collection. This ensured strong methodological integration between the qualitative and quantitative phases.

Quantitative data analysis was conducted manually using Microsoft Excel. Initially, incomplete or clearly erroneous responses were excluded (data cleaning). Descriptive statistical methods were then applied, including:

- Frequency distributions;
- Cross-tabulations; and
- Visualisations (e.g. bar charts).

Statistical methods were deliberately not applied, as the aim of this exploratory study was not hypothesis testing, but rather pattern recognition and contextual understanding.

Each questionnaire item was linked to one or more codes or themes from the qualitative phase. This connection was visualised in a validation matrix, mapping the relationship between interview codes, questionnaire items, and research questions. This matrix is presented in Section 4.3 as part of the results.

3.3.5 Ensuring Validity, Reliability and Trustworthiness

To uphold the methodological quality of the study, a range of measures was implemented to systematically support validity, reliability, and trustworthiness. Special attention was given to coherence, transparency, and researcher reflexivity:

- Triangulation: The combination of qualitative and quantitative methods, along with the inclusion of diverse perspectives from industry experts to operational practitioners, strengthened the credibility of the findings;
- Piloting: All research tools were tested in advance through pilot studies and refined based on feedback to improve clarity, technical reliability, and relevance;
- Data protection and anonymisation: Data collection and handling adhered to GDPR and institutional ethical guidelines. Personal data were fully anonymised to ensure participant confidentiality;
- Researcher reflexivity: The researcher's potential influence was acknowledged through documented self-reflection and critical awareness of possible bias; and
- Transparent coding and traceability: A systematic analytical process was maintained, linking raw data, codes, themes, and final interpretations in a traceable way.

Together, these measures ensured that the findings are not only valid and reliable, but also transferable and practically relevant—especially in the context of halal certification in the German chemical and pharmaceutical sectors.

3.4 Ethical Considerations

This section outlines the ethical foundations of the research design and supports the study's overall methodological integrity. Ethical principles informed all stages of the project. The study was carried out with great care, focusing on protecting participants, reducing potential risks, respecting autonomy, and ensuring transparency and confidentiality.

The research was conceptualised and conducted in strict accordance with recognised standards of empirical social research, with its ethical framing informed by the guidelines of Bryman (2012), the German Data Forum (RatSWD, 2017), and the ethical theories proposed by Oliver (2010) and Gray (2004).

The study also received formal ethical approval from the Humanities, Arts and Social Sciences Research Ethics Committee (HASSREC) at the University of Worcester. All participants were given a detailed PIS in advance, outlining the purpose of the study, their role, data protection measures, and their rights—including the right to decline or withdraw at any time without disadvantage.

The role of the researcher was also informed by Immanuel Kant's moral philosophy (Weischedel, 1957), which holds that actions carry moral worth only if performed out of duty rather than self-interest or external pressure. In this spirit, the entire research process was ethically considered and carefully documented.

3.4.1 Protection from harm

A central ethical objective of this study was the active protection of participants from any form of physical, psychological, or social harm. Potential risks were identified during the planning phase, and mitigation strategies were established to avoid them. These included:

- Carefully phrasing in-depth interview questions to avoid culturally sensitive, inappropriate, or potentially distressing topics;
- Monitoring participants' reactions during interviews to respond appropriately to any signs of discomfort;
- Discussing religious or cultural topics only with the participant's explicit consent; and
- Reviewing open-ended responses and removing any discriminatory or stigmatising content from the analysis.

The PIS clearly stated that participation would not involve any risk of harm, distress, or reputational damage. The identities of participants and their organisations would not be revealed in the analysis or any publications. Due to structural similarities within the chemical-pharmaceutical sector, full industry-wide anonymisation was both feasible and credible.

The internet questionnaire was also designed to minimise emotional strain and to respect cultural and religious sensitivities. It contained no manipulative content or leading questions. Participants were informed that they could contact the researcher or an independent representative at the University of Worcester at any time with questions or concerns.

3.4.2 Informed Consent

A fundamental element of ethical research is the voluntary and informed consent of participants. To ensure this, all potential participants were informed both verbally and in writing about the study's purpose, scope, and procedures. The PIS served as the foundation for this communication, providing detailed information on:

- The background and objectives of the study;
- The type of data collection;
- The duration and content of participation;
- The intended use and storage of data;
- Measures to protect anonymity; and
- The right to voluntary participation and withdrawal.

Participants were given sufficient time to review this information, ask questions, and decide whether to participate. Consent was documented in writing for in-depth interviews and electronically for the internet questionnaire. Participants also agreed that anonymised quotations could be used in research reports or publications.

Importantly, the PIS included a clear statement of the right to withdraw: participants could revoke their consent up to seven days after data collection by providing their individual participant ID. In such cases, all associated data were permanently deleted.

3.4.3 Confidentiality and Anonymity

The confidentiality and anonymity of all data collected were maintained as core ethical principles. Only data essential to the research objectives were collected, and strict security measures were applied throughout:

- All personal identifiers (e.g. names, organisations, locations) were removed during transcription and qualitative analysis;
- The internet questionnaire was designed so that no IP addresses, login data, or traceable information were collected;
- Contact information (e.g. for follow-up or result requests) was stored separately from research data to prevent re-identification; and
- All data were stored and secured in accordance with GDPR and the guidelines of the University of Worcester.

The PIS also clarified that research publications or presentations would not allow identification of individuals or organisations. Personal data will be stored securely for a maximum of ten years and subsequently deleted.

These procedures ensured that participants were protected from reputational risk, professional disadvantage, and cultural stigmatisation at all times.

3.4.4 Transparency and Honesty

Transparency and honesty were upheld throughout all phases of the research project. Participants were clearly informed about the study's purpose, research methods, use of data, and their role. This information was provided through the Participant Information Sheet, complemented by verbal or digital opportunities for question.

The following ethical principles were rigorously observed:

- Avoidance of deception or hidden objectives;
- Disclosure of any potential conflicts of interest;
- Availability of the researcher for questions or complaints at any time; and
- Option to receive study findings upon request.

The PIS also provided details for an independent contact person at the University of Worcester, ensuring that participants had access to a neutral point of contact outside the research team.

All findings were reported transparently, with methodological limitations explicitly stated and potential biases critically reflected. This level of scholarly openness further reinforced the ethical credibility of the study.

3.5 Chapter Summary

This chapter has outlined the methodological approach adopted in this study. It detailed the underlying philosophical position, justified the chosen research design, and described the

specific procedures for data collection, analysis, and quality assurance. The study was grounded in a pragmatic and interpretivist paradigm, acknowledging the socially constructed and context-sensitive nature of halal certification processes within the German chemical-pharmaceutical sector.

An exploratory, sequential mixed-methods design was employed. The first phase, comprising in-depth interviews with industry experts and senior managers, generated rich, contextual insights. These were followed by a structured online questionnaire designed to validate, prioritise, and broaden the themes that emerged during the qualitative phase. Both instruments were piloted and refined prior to implementation. The qualitative data were analysed thematically using inductive coding supported by a numeric relevance scale, while the quantitative data were analysed descriptively and triangulated with the interview findings.

The quality assurance strategy was guided by Lincoln and Guba's (1985) four criteria for trustworthiness: credibility, transferability, dependability and confirmability. These were put into practice through methodological triangulation, purposive sampling, transparent analytical documentation and continuous researcher reflexivity.

Ethical standards were upheld throughout, in accordance with the GDPR and the university's ethical guidelines. Participants were fully informed, consent was obtained, and data were anonymised at all stages.

Overall, this chapter has established the methodological foundation for the data analysis and practical recommendations presented in the following chapter.

4 DATA ANALYSIS

4.1 Qualitative Findings

The analysis of the in-depth interviews is structured around seven central areas, each of which contributes directly to addressing the core research questions. This framework reflects the conceptual breadth and practical depth of the participants' responses and serves to structure the qualitative data in a coherent and analytically meaningful way. Specifically, the analysis explores the following themes: participants' interpretation of the term halal; the background and significance of halal certification; potential implications for organisations; the role of certification standards; the importance of a holistic understanding; the operationalisation of halal certification processes; and, finally, the opportunities and barriers associated with a comprehensive approach. The subsequent subsections present a detailed description of each theme.

The interview transcripts were analysed through a structured coding procedure, developed inductively and documented in detail in Appendix 7.4. All themes were coded manually and then clustered according to their conceptual proximity to the three main research questions. Each code was evaluated using a four-level relevance matrix (from 1 = not relevant to 4 = very relevant), enabling prioritisation and a systematic comparison of sector-specific patterns. The coding matrix also allowed for the identification of thematic concentrations and sectoral differences across both the chemical and pharmaceutical domains. The scoring approach used both numeric values and visual symbols to reflect the strength of emphasis across all participants. This semi-quantitative dimension supports the traceability of results and informs the comparative discussion in Subsection 4.3.3.

Abbreviations used

P: Participant
CS: Participant from the **C**hemical **S**ector
PS: Participant from the **P**harmaceutical **S**ector

4.1.1 Interpretation of Halal by the Participants

This theme contributes to Research Question 1 by examining how halal is interpreted across the chemical and pharmaceutical sectors. The aim of this subsection is to explore how participants define the term halal, what associations they attach to it, and how these perceptions inform expectations regarding halal-compliant products.

Responses indicated a consistently high level of familiarity with the concept. All participants strongly linked halal to religion, specifically Islam and the Quran. This association was evident in both the chemical (CS: P2, 4, 7, 8, 11, 12, 14) and pharmaceutical sectors (PS: P1, 3, 5, 6, 10, 11). Furthermore, there was broad agreement that halal entails the exclusion of non-compliant inputs, such as pork-based derivatives and alcohol-containing substances (PS: P4, 7, 8, 12; CS: P1, 3, 6, 9, 10, 11).

Beyond its religious definition, halal was also described as carrying significant social meaning. Several participants, particularly from the pharmaceutical sector, referred to halal as a value system grounded in community and shared behavioural norms. For example:

> *(P1, 3:25, PS) "Well, halal has to do with religion, with Islam. It's a social guideline; I don't know what the right word is, from Islam, and it's about some kind of guidelines for the industry [...]".*

Participant 13 highlighted that halal serves as a form of ethical and behavioural guidance for devout Muslims (PS: P13). In contrast, some participants from the chemical sector (e.g., CS: P11) considered this communal dimension to be less central. Nonetheless, there was general agreement across sectors that halal holds strong symbolic value within the target group.

Participants from both sectors further acknowledged that halal compliance is closely linked to individual and collective identity, cultural values, and tradition. These elements were seen as key drivers of consumption behaviour in Muslim-majority contexts. Countries with larger Muslim populations were perceived to enforce more rigorous halal requirements, shaped by dominant societal belief systems.

Such frameworks were viewed as critical in influencing how products are received and in determining the perceived credibility or sufficiency of certification schemes:

> *(P11, 2:13, CS) "But halal is not just some market requirement because that's religion-driven; that's a bit stronger than other requirements. It's not so grey; it's either halal or not for people who value it."*

Participant 12 from the chemical sector noted that Muslims generally make individual choices regarding halal adherence, while the rules themselves are clear and non-negotiable (CS: P12). This distinction underscores the role of religious conviction and personal responsibility in halal consumption.

Notably, while both sectors agreed on the religious foundation of halal, participants in the pharmaceutical sector were more likely to emphasise its social dimension, including elements

such as group loyalty and community norms. This suggests that although there is a shared baseline understanding of the concept, the emphasis placed on particular dimensions varies across sectors.

These perspectives were consistently rated as highly relevant (level 3–4) in the coding matrix, particularly the religious dimension and the community-related aspects (cf. Appendix 7.4).

In summary, this theme confirms that halal is primarily perceived as a religious obligation but also encompasses social, identity-related, and regulatory expectations. These findings are directly relevant to Research Question 1, as they provide insight into stakeholder interpretations that must inform both certification processes and product development strategies.

4.1.2 Background and Significance of Halal Certification

This theme directly contributes to Research Question 1 by exploring the religious, cultural, and social foundations of halal consumption and certification. It further informs Research Question 2 by illustrating how societal dynamics within Germany influence halal-related expectations and operational challenges for companies.

Religious belief was identified by participants from both sectors as the primary motivation for halal consumption, although social traditions and cultural norms also played a significant role (CS: P4, 7, 8, 11, 12, 13; PS: P1, 3, 5, 6, 9, 10, 13). For example:

> *(P3, 2:10, PS) "So I could imagine, without knowing, that believers, or in this sense, orthodox Muslims, try to live according to the rules of the Quran, which may provide regulations on how to live, how to eat, and what kind of lifestyle one should lead. From this, one may derive what is allowed and what is not, particularly regarding what one supplies to the body."*

Participant 12 noted that such beliefs are often deeply rooted in tradition and closely connected to an individual's place of birth or family background (CS: P12). In non-Muslim countries such as Germany, halal consumption tends to be niche-oriented, with community belonging occasionally generating subtle social pressure (PS: P9).

The family environment emerged as a key influence on consumption behaviour (CS: P6). While consumption patterns are fundamentally grounded in religious prescriptions, participants acknowledged that they are also shaped by cultural habits or lifestyle preferences, such as the avoidance of pork or alcohol. There was general agreement that religious identity reinforces halal practices, particularly in Muslim-majority countries where these norms are more socially embedded (PS: P10).

Participants also observed generational and regional variation in the interpretation and application of halal. Younger Muslims were perceived to follow halal practices with greater flexibility, reflecting broader cultural context and individual choice (CS: P7; PS: P13). By contrast, in countries such as Malaysia or Indonesia, halal compliance is shaped by more stringent, state-driven mandates. As one participant explained:

> *(P5, 7:22, PS) "[...] That is not the content of the concept for me, but rather this issue of loyalty. I was raised and educated in such a way that if I belong to a religious or cultural context, I have to live these principles as well."*

Participants also suggested that halal certification could increasingly appeal to non-Muslim consumers in the future, particularly due to its associations with product quality, ethical production practices, and transparency:

> *(P11, 11:39, CS) "… in many Muslim countries where there are strict rules—i.e., not Singapore or Indonesia, but rather Arab countries or the Middle East—the state may prescribe that only halal products be offered, and everything else is prohibited. That's more of a political issue than a reflection of the culture in the respective country and how open and tolerant people are towards others. That gets a bit complicated."*

Finally, participants described halal requirements as dynamic and subject to ongoing evolution, particularly in response to shifting policy environments and the growing influence of global trade expectations. These developments were seen to further complicate the interpretation and implementation of halal standards across sectors.

The coding results confirm the central role of religion, cultural tradition, and identity in shaping halal consumption patterns, all of which received average relevance ratings of over 3 across sectors.

In summary, this theme demonstrates that halal is a multidimensional construct shaped by religious doctrine, cultural norms, personal and collective identity, and regulatory frameworks. These interrelated dimensions are critical for understanding consumer behaviour (RQ1) and for anticipating the strategic and operational implications of halal certification within the German chemical-pharmaceutical industry (RQ2).

4.1.3 Possible Implications of Halal Certification

This theme is relevant to Research Question 2, as it explores how companies assess the strategic, operational, and regional implications of halal certification. Participants provided insights into practical measures, strategic alignment, and market responses.

The importance of halal certification (Question 4) was discussed in three areas: strategic positioning, regional variation, and differentiation potential. While its strategic role is currently seen as limited (CS: P8, 12, 14; PS: P1, 3, 6), participants agreed that market trends should be monitored closely, and possible opportunities regularly assessed.

Rather than treating halal as a standalone strategy, many companies integrate it into existing quality or certification systems. Participants from both sectors highlighted their experience with regulatory complexity as a competitive advantage (CS: P2, 11). One participant explained:

> *(P12, 15:25, CS) "Sure, of course. It's demand and supply. The demand is there, and it's increasing, so you have to adapt to the supply and eliminate everything that stands in the way of that supply. That's the strategic development. […]."*

Country-specific requirements were considered critical, particularly due to the lack of a unified global halal standard (CS: P4, 7, 11, 12, 14; PS: P1, 3, 5, 9, 13). In key markets such as Malaysia or Indonesia, the absence of halal certification may serve as a barrier to entry (CS: P14).

In the chemical sector, halal certification was generally viewed as a weaker form of market differentiation (CS: P4, 12, 14). In contrast, participants from the pharmaceutical sector acknowledged a greater potential (PS: P1, 6, 10). Some also noted that halal-labelled products could appeal to non-Muslim consumers, particularly when associated with ethical or quality-related attributes (PS: P10).

Regarding market positioning and growth opportunities (Question 5), participants across both sectors acknowledged that halal certification may support strategic objectives, particularly when aligned with growth-oriented strategies (CS: P4, 7, 11, 12; PS: P3, 6, 9, 10). However, such decisions were frequently described as decentralised or site-specific:

> *(P3, 11:53, PS) "Yes, if the pharmaceutical industry at some point discovers this trend for itself and also pursues it, I can already imagine that many colleagues also have much greater potential than I do so in my location."*

Although halal certification is not yet embedded as a core strategic priority, participants agreed that it is best integrated into broader quality, regulatory, or compliance systems to support long-term, sustainable market development.

Both sectors acknowledged that halal certification has a significant impact on production processes and technological workflows (CS: P2, 4, 7, 8, 11, 14; PS: P1, 3, 5, 9, 13). However, participants often referred to unclear or inconsistent audit requirements as a key challenge during implementation, particularly in relation to the segregation of certified and non-certified materials.

Participants stressed that a strategic and coherent approach is essential (Question 6):

> *(P8, 14:59, PS) "Yes, then we have to clearly define what we want. Do we want to offer our entire portfolio in halal? Does it make sense that we do everything - first of all, a fundamental decision - do we do halal where it is required, or do we only do halal?"*

Common pitfalls included ad hoc implementation, unclear responsibilities, and fragmented strategies (PS: P1). In the chemical sector especially, participants reported conflicts of interest and profitability concerns, as certification often requires costly adjustments to product portfolios (CS: P2, 4, 8, 11, 14).

Therefore, halal-related decisions should be based on solid market analysis and a clear understanding of the full value chain (PS: P6). Several participants also recommended using halal labelling and targeted marketing to increase consumer trust and product visibility (PS: P10).

Inconsistencies between certification bodies were seen as an ongoing challenge (PS: P13). To improve alignment and credibility, participants emphasised the need to integrate suppliers and contract manufacturers into halal strategies. This supports consistent implementation and helps ensure both compliance and social acceptance.

Participants' views on strategic integration and certification as a market driver were coded with mid-to-high relevance (average scores between 2.9 and 3.4), suggesting a growing awareness but limited institutionalisation.

4.1.4 Certification Standard

This theme is closely related to Research Questions 1 and 2, as it addresses the relevance, complexity, and implementation of halal certification standards in the chemical-pharmaceutical industry.

The discussion on the role of standards (Question 7) centred on two aspects: reliability and safety, and certification as a market requirement. It is no longer seen as a competitive edge, but rather a basic condition for market access.

Participants from both sectors (CS: P2, 4, 7, 8, 11, 12, 14; PS: P1, 3, 5, 6, 9, 10, 13) emphasised that certification builds trust, enables comparability, and ensures regulatory alignment. Customers expect certified products, and a lack of certification may lead to immediate exclusion. This market pressure obliges companies to invest continuously in compliance:

> *(P14, 16:52, CS) "[…] Not when the basic quality standard is concerned, which is now so widespread in the industry that you actually disqualify yourself from the outset as a partner in the industry if you don't offer these standards."*

In the pharmaceutical sector, certification is regarded as a fundamental operational requirement (PS: P1, 3, 6, 9, 10, 13). In most countries, pharmaceutical products must be certified to obtain market authorisation; without certification, production and distribution are not permitted. This legal mandate underscores the critical relevance of certification:

> *(P1, 17:29, PS) "[...] We are probably one of the industry's most dependent on certification from that point of view."*

Furthermore, certification can facilitate faster response times in customer service, especially for inquiries about ingredients or product provenance:

> *(P10, 15:00, PS) "Yes, sometimes people ask about it; for example, in the area of microplastics or organic products, there is often customer demand for a certain seal. Yes, with halal I might also imagine that."*

Despite wide acceptance, some participants raised concerns about certification inflation, inconsistent standards, and varying levels of certifier competence. In the halal context, some questioned the objectivity and expertise of certification bodies:

> *(P8, 16:43, PS) "I think we are in a certification mania. [...] We spend a lot of money and effort on documenting that we are good, that we have organised our processes well, yes, but how they actually run then - there is a big delta. [...]."*

A further issue was the effort needed to implement halal certification (Question 8). Manufacturing processes and resources were key challenges in both sectors.

Participants from the chemical sector (CS: P2, 7, 8, 11, 12, 14) emphasised the high complexity of production lines, noting the importance of detailed clarity from the outset (CS: P14). From

raw material selection to production facility design, every element must ensure complete avoidance of prohibited substances. Moreover, all downstream processes, including procurement, storage and delivery, must comply with halal guidelines. The absence of a global standard was repeatedly identified as a barrier, with participants describing halal certification as a constantly shifting target:

> *(P14, 19:17, CS) "[…] So, erm, with every upcoming audit to get, erm, the halal certificate, sort of operating in a black box, erm, and not knowing what to expect, not knowing what is necessary, erm, to get the certification, it is of course an extreme obstacle. And annoyance."*

In the pharmaceutical sector, challenges were seen in bureaucracy and limited digitalisation (PS: P3). Nonetheless, sector-specific knowledge was said to facilitate implementation. The effort required was lower for new product lines compared to the adaptation of existing formulations (PS: P1, 3, 5, 6, 9, 13).

Improvements to the certification process (Question 9) were suggested, starting with closer dialogue between certifiers and industry (CS: P4, 7, 11, 12; PS: P3, 6, 9). Internally, companies should establish clear responsibilities and dedicated roles to manage certification (CS: P2, 7, 14; PS: P3, 9, 13).

Participants acknowledged they have limited influence over halal criteria, which are mainly set by certifiers (CS: P12). To address this, they proposed more transparency and forming industry alliances:

> *(P3, 24:05, PS) "... [as an organisation] can say we go ahead and create transparency. How we do that, certain factors behind it, how you define a standard and how you intend to raise it and get that certified and that in turn, or audit and certify and try to attract others, yes."*

A key challenge is that halal standards need to be clearly defined to be measurable. But diverging interpretations between certifiers make this difficult:

> *(P9, 29:49, PS) "Everything that is not measurable is also difficult to implement because it can go as far as arbitrariness. And I think that will be difficult."*

As a result, halal certification is seen as a gradual, long-term process. Some efforts were postponed due to unclear conditions (CS: P2). A sustainable approach requires a clear

framework, including the appointment of a halal officer (CS: P7) to coordinate internal training and knowledge sharing.

This theme was consistently marked as relevant (average rating >3), reflecting its practical urgency for companies.

4.1.5 Importance of a Holistic Understanding

This theme supports Research Questions 1 and 3 by evaluating the strategic relevance of cultural understanding and the internal implementation of halal requirements.

The assessment of a comprehensive understanding of halal (Question 10) focused on two key actors: the Muslim target group and the role of certification bodies. Participants from the chemical sector tended to delegate this understanding entirely to certifiers (CS: P7, 8, 12, 14), whereas the pharmaceutical sector showed more interest in building internal knowledge (PS: P1, 3, 6, 9, 10, 13).

Some participants from the pharmaceutical industry saw added value in investing in cultural understanding, as this was believed to support authentic market positioning, more effective communication, and better access to Muslim-majority markets (PS: P9). It was also seen as a way to anticipate changes in halal standards and expectation.

However, a central question emerged: who holds responsibility for cultural and religious expertise—manufacturers, certifiers, or external advisors? Depending on organisational resources, international presence, and business model, companies may choose to build in-house capacity or work with external partner.

Participants emphasised that halal is not a fixed concept; its meaning evolves over time and across regions, depending on socio-cultural and regulatory influences:

> *(P4, 33:35, CS) "… will halal certification stay the way it is, in the next few years? Will it develop further? Is it a halal certification 1.0, and then a 2.0 will come, and then you need other things? [...] There is no change of Quoran as far as I know, but interpretation is always the issue in religion. Can it change over time? It could."*

Regarding the integration of halal into corporate strategy (Question 11), both sectors stressed the importance of embedding halal requirements into broader strategic frameworks, as this enhances consistency and operational quality (CS: P2, 4, 8, 11, 12, 14; PS: P3, 5, 6, 13). A well-

defined strategic approach was viewed as instrumental in streamlining implementation and facilitating internal alignment.

Many organisations integrate halal certification into established management systems, such as ISO or GMP. In larger companies, responsibility is often decentralised, with country-level teams overseeing the local execution of halal-related requirements:

> *(P3, 37:49, PS) "Yes, so we have, erm, even if there are international standards, we have responsible people in the countries in the company structure who implement this strategy, strategic decisions operationally, know the certification measures exactly, are in dialogue with the authorities about what to do, erm, locally that is the case here, I would say now, and also with halal, and I think that it should also be like that."*

Overall, participants agreed that halal certification needs to align with both strategic goals and operational needs. Tailored approaches at the market level (PS: P1) were seen as key to meeting regulatory demands and consumer expectations in culturally diverse settings.

4.1.6 Halal Certification Processes

This theme addresses Research Questions 2 and 3 by evaluating how companies manage the operational and international complexity of halal certification.

Participants from both the chemical (CS: P2, 4, 7, 8, 11, 12, 14) and pharmaceutical (PS: P1, 3, 5, 6, 9, 10, 13) sectors reported that halal certification must be adapted to local regulations, especially in markets with large Muslim populations (Question 12). Requirements in Asian countries were described as particularly strict:

> *(P7, 39:00, CS) "[…] we can clearly say that there are differences whether the audit, halal audit, takes place at a stand in [Asia] or in Europe, yes, definitely. Well, I am glad that we are sitting here and not in [Asia]. So, they are really, really, really strict..."*

These differences increase regulatory complexity and require careful evaluation of costs and benefits (CS: P4). A key strategic question (Question 13) is whether to follow a unified global standard or pursue regionally adapted approaches. Participants debated which strategy would better support compliance and operational efficiency.

In theory, harmonisation would simplify processes. In practice, participants noted that global halal umbrella organisations are not yet coordinate:

(P12, 29:40, CS) "[…] It would be ideal if all the umbrella organisations, there are different ones in [Asia], yes, these umbrella organisations got together and agreed on what the demands are and ideally set them down in a standard. At the moment, some of the organisations are fighting each other, it's not always peace, joy and happiness..."

Another issue is the inconsistent classification of ingredients. For example, ethanol may be accepted in one country and prohibited in another (PS: P1). These inconsistencies require careful coordination and clear internal procedures.

Certification projects must be economically justified, especially where the entire process chain is impacted (PS: P3). Companies with experience in Muslim-majority countries are better positioned to navigate such challenges (PS: P9). However, complex implementation without a clear business rationale is unlikely to succeed.

Participants also identified major obstacles (Question 14), such as vague requirements, inconsistent audits, and unclear strategy. Some companies hired halal consultants to address these gaps. A solid strategic framework was seen as essential (CS: P2, 7, 8, 12, 14; PS: P3, 5, 7), but practical resource management was also important (CS: P4, 8, 14; PS: P6, 10, 13).

In non-Muslim-majority countries, awareness-raising is necessary, as halal is often not actively expected by consumers:

(P10, 29:12, PS) "Well, I think the biggest challenge would be to make it clear to the customers, i.e., the Muslims living in Germany, that you can actually get halal goods in non-Muslim shops. That they understand this idea at all. They don't expect that at all, and that's why I see it as a really big challenge to get them in at all."

To build acceptance, targeted marketing and awareness campaigns are needed. Nonetheless, halal certification remains a peripheral consideration that must be embedded within everyday operational procedures:

(P10, 33:30, PS) "It has to fit into the daily routine; as I said, it is and remains a marginal process for me, and it has to be compatible with the daily processes we have in the pharmacy."

Both sectors acknowledged that halal certification can act as a driver of innovation, though its strategic significance is still limited (Question 15). Seamless integration into existing systems was seen as essential to avoid duplication and support quality management.

Digital tools (Question 16) were seen as helpful for improving transparency, documentation, and efficiency (CS: P4, 7, 12; PS: P1, 3, 6, 9, 10, 13). However, participants also raised concerns about data protection and dependence on major tech platforms:

> *(P4, 47:32, CS) "[...] Where is this information? If, at some point, the big gaffers have everything, all the information in the world, then the whole industry will be made by Google, Amazon, Facebook and Apple, and we won't have anything to say anymore. Sometimes, I'm a bit nervous about that; it's also a personal opinion, not necessarily the opinion of the company. But data, digitalisation - yes, but only with strong data protection."*

Therefore, digitalisation should go hand in hand with robust data privacy frameworks. At the same time, companies were encouraged to respond to the digital habits of younger Muslim consumers, especially in marketing and engagement (PS: P10). Nonetheless, many companies still use manual or Excel-based systems, making digitalisation a priority for improvement, but not yet a universal solution.

4.1.7 Opportunities and Barriers of a Holistic Approach

This theme supports Research Questions 2 and 3 by examining the benefits and challenges of implementing a holistic halal certification strategy. It highlights both the strategic opportunities and the operational barriers that companies face when integrating halal certification across their value chains.

Halal certification was widely regarded as a form of market differentiation (Question 17). Participants across both sectors (CS: P2, 4, 7, 11, 12, 14; PS: P1, 3, 5, 6, 9, 10) reported that organisations offering halal-certified products could stand out from competitors that either lack certification or do not actively promote it.

In the chemical industry, participants emphasised that halal certification creates new business opportunities, especially when implemented consistently and strategically. This approach was seen to enhance agility, transparency, and internal process management (CS: P7). One participant noted:

(P4, 50:35, CS) "We have so far probably proceeded very opportunistically, right, not opportunistically - tactically - on the issue. […] Do we already have that strategically? Have we addressed that strategically? I don't think enough."

In the pharmaceutical sector, halal certification was perceived as a distinctive selling proposition, especially in non-Muslim-majority contexts. A comprehensive strategy was considered a pathway to access underserved markets and connect with a highly networked consumer group (PS: P10).

Nevertheless, the barriers to implementation (Question 18) were significant. Participants cited limited internal resources, regulatory complexity, and vague requirements as major challenges (CS: P7, 12, 14; PS: P3, 5, 6, 13). A recurring issue was the lack of in-house cultural or religious knowledge, as most companies relied on existing teams rather than building specialised internal expertise (CS: P12).

This creates a strategic choice: whether to invest in internal capacity-building or outsource halal expertise to reduce the operational burden. However, outsourcing increases costs and requires companies to evaluate the long-term value of halal certification:

(P14, 36:40, CS) "... it is about how much can I gain on the one side [with halal] and what do I lose in return on the other side [without halal]."

Another notable barrier was the lack of transparency in halal requirements (Question 19). This ambiguity impedes strategic alignment and hinders management decision-making (CS: P2, 4, 11, 12; PS: P1, 5, 13). Participants stressed the importance of internal communication and training to ensure cross-departmental coherence:

(P1, 43:02, CS) "[…] So, making sure that each level understands sufficiently well: Why are we doing what we are doing and what is the goal? [...] What does that mean exactly? And then maybe talk again at the marketing/production interface about what can I do now? How can I implement it and how not? [...]."

Despite these barriers, halal certification was also seen as an opportunity to strengthen organisational capability and structure. In the chemical sector, this included process innovation and proactive external communication (CS: P4), while pharmaceutical participants emphasised the added clarity and credibility gained through structured halal programmes (PS: P1, 3, 5, 6, 9).

Participants from both sectors also emphasised the need to communicate the value of halal certification to the target group (CS: P2, 4, 7, 8, 11, 12, 14; PS: P1, 3, 6, 10, 13). A clear

communication strategy was seen as key to building consumer trust and reinforcing the effectiveness of a holistic halal approach.

In conclusion, participants agreed that halal certification can succeed only if it is part of a long-term strategy based on continuous improvement, transparent operations, and organisational clarity (CS: P9).

The comprehensive approach was thematically rich, with codes addressing transparency, consumer trust, and resource constraints consistently rated between 3.0 and 3.3 (1 = not relevant to 4 = very relevant).

4.2 Quantitative Findings

This section presents the quantitative findings from the internet questionnaires, structured around six thematic areas. Each section corresponds to a thematic focus introduced in Section 4.1, allowing for a structured comparison between qualitative and quantitative data.

The quantitative results serve to validate and contextualise the qualitative findings by confirming patterns, highlighting consistencies, and identifying sector-specific nuances.

The link between the qualitative themes and the design of the quantitative instrument is explained in Subsection 4.3.1.

4.2.1 Definition of the Term Halal and Significance of Halal Certification

This subsection examined how participants defined the term halal and assessed the importance of halal certification for the Muslim community. It supported the qualitative findings in Subsections 4.1.1 (Participants' Interpretation of Halal) and 4.1.2 (Background and Significance of Halal Certification), contributing directly to Research Question 1 and supporting Objective 1.

The findings showed that most respondents were familiar with the concept of halal and understood it mainly within a religious context. In the chemical sector, 75% of respondents correctly defined halal as permissible goods for Muslims in Islam, compared to 70% in the pharmaceutical sector. Additionally, 12% (chemical) and 17% (pharmaceutical) associated the term mainly with its Islamic origin—an observation also found in the qualitative interviews.

Halal refers to what is permissible or lawful in traditional Islamic law and applies to various domains, including food, finance, and increasingly, pharmaceuticals and chemicals.

In terms of the expected relevance of halal certification, 77% of respondents in the chemical and 76% in the pharmaceutical sector considered it to be highly significant. This underscored the

growing perception of halal not merely as a cultural or religious marker but as a strategically important certification within these industries.

The data also showed that personal experience, such as religious upbringing, shaped participants' views. Open-text responses reflected a range of associations—from accurate religious definitions and cultural norms to occasional misconceptions.

Overall, these findings reinforced the strategic importance of halal certification for long-term market development and supported both Objective 1 and Objective 2.

4.2.2 Assessment of Halal Certification Factors and their Role for the Muslims

This subsection explored how participants assessed the role of Islamic beliefs, cultural values, and personal identity in relation to halal certification. The findings reflected the qualitative themes discussed in Subsections 4.1.2 (Background and Significance of Halal Certification) and 4.1.3 (Potential Impacts of Halal Certification).

A total of 79% of respondents in the chemical sector and 78% in the pharmaceutical sector rated religious belief as highly important. This is shown in the following figure:

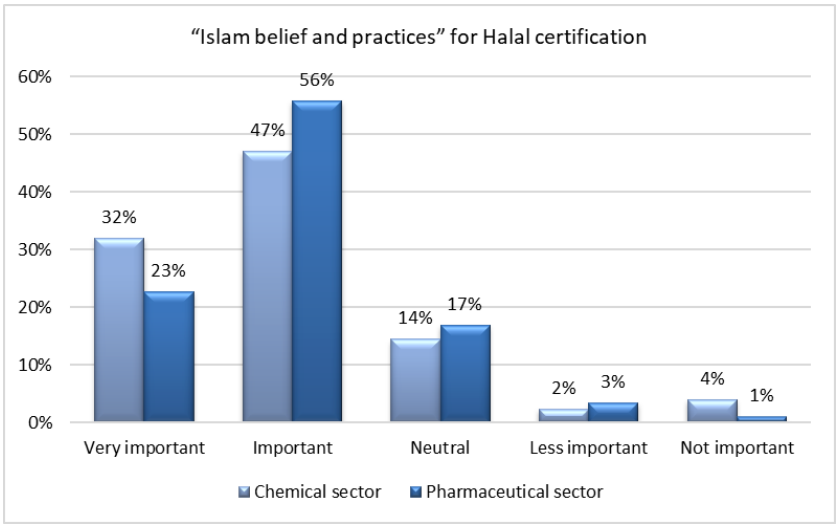


Figure 4-1: Islam belief and practices

In the open-text responses, participants particularly emphasised trust, security, and a sense of belonging—factors that had also been highlighted in the qualitative in-depth interviews as key socio-cultural dimensions of halal.

Halal certification is not solely a matter of religious compliance; it also encompasses broader cultural expectations and emotional associations within Muslim communities.

These findings confirmed that an effective halal certification strategy must address both religious and cultural factors (Objective 1). They also underlined the importance of cultural and religious sensitivity, supporting Research Questions 1 and 2.

4.2.3 Halal Market and its Impact on the Chemical-Pharmaceutical Industry

This thematic area examined participants' perceptions and evaluations of the development of the halal market and its potential impact on the chemical-pharmaceutical sector. It extended the qualitative insights presented in Subsection 4.1.3 (Potential Impacts of Halal Certification).

Most respondents anticipated continued market growth: 75% from the chemical sector and 73% from the pharmaceutical sector expected halal's relevance to increase in the future. This indicated a growing awareness of halal certification as a key factor in entering new markets.

Additionally, 85% of respondents from the chemical and 78% from the pharmaceutical sector stated that halal certification should be actively promoted to benefit from market growth. A structured certification strategy was widely seen as a competitive advantage.

These results confirmed the qualitative insight that halal certification holds not only regulatory but also economic and strategic relevance. Accordingly, they supported Research Question 2 and Objective 2, which focused on identifying the strategic challenges and opportunities associated with halal certification.

4.2.4 Certification for the Chemical-Pharmaceutical Industry in Germany

This thematic area complemented the qualitative findings presented in Subsection 4.1.4 (Certification Standards) and explored participants' evaluations of certification in general and halal certification in particular.

The majority of participants indicated that certification standards were of central importance for economic success. Specifically, 92% of respondents from the chemical sector and 87% from the pharmaceutical sector rated certifications as either very important or important.

In terms of implementation effort, 87% (chemical) and 82% (pharmaceutical) of respondents perceived general certification processes as demanding or highly demanding. Halal certification in particular was considered resource-intensive by 74% of respondents in the chemical sector and 58% in the pharmaceutical sector. This finding suggested that the chemical industry, in particular, experienced implementation as especially challenging.

These findings echoed the qualitative data. While certification is viewed as essential, halal certification was seen as requiring significant effort, particularly in terms of resources and processes. The sector-specific differences highlighted varying implementation challenges.

4.2.5 Halal Certification Processes for the Chemical-Pharmaceutical Industry

This thematic area analysed participants' perspectives and preferences regarding the implementation of halal certification processes. It built on the qualitative findings presented in Subsection 4.1.6 (Halal Certification Processes).

A total of 64% of chemical and 68% of pharmaceutical respondents considered the introduction of new halal-related processes realistic. Both groups stressed the need for clear guidelines, sufficient resources, and strategic flexibility.

The majority expressed support for strict and standardised halal requirements that would be recognised internationally. In contrast, nationally fragmented regulations were viewed as burdensome and inefficient. The use of digital tools was generally seen as beneficial but not regarded as a top priority.

In the open-text comments, participants particularly highlighted the importance of robust business cases, flexible process models, and market-oriented solutions—points that aligned closely with the qualitative findings.

4.2.6 Assessment of a Holistic Understanding of the Halal Certification

This thematic area examined the significance of a comprehensive understanding of religious, cultural, and market-specific contexts, as well as their integration into organisational structures. It served to validate the findings presented in Subsection 4.1.5 (The Importance of a Holistic Understanding).

The majority of participants emphasised that an in-depth understanding of the Muslim target group, their values, and the specific requirements of the halal market was of central importance. A total of 79% of respondents from the chemical sector and 74% from the pharmaceutical sector rated this understanding as important or very important.

Internal organisational factors were also rated highly: 80% (chemical) and 82% (pharmaceutical) considered sound knowledge of internal structures and value chains to be essential. The perceived importance of a holistic halal approach was 83% and 82%, respectively, as figured in following picture:

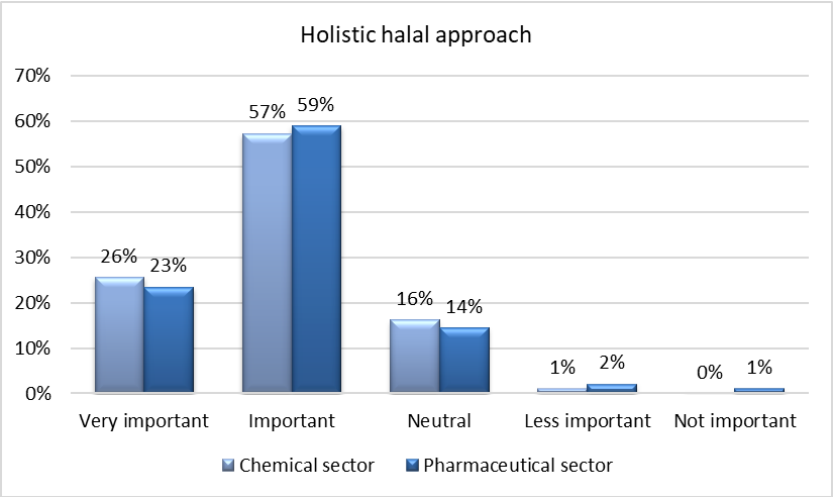


Figure 4-2: Holistic halal approach

Differences between management and technical staff were also observed. Technical staff consistently rated the relevance of these factors more highly. Nevertheless, there was broad agreement that halal strategies must be embedded at a strategic level and supported across the organisation.

These findings strengthened Research Question 3 and Objective 3, both of which focused on the internal anchoring of halal strategies and the development of a deeper organisational understanding of halal-related processes.

4.3 Comparative Analysis and Integration of Findings

4.3.1 Mapping QUAL–QUANT Themes to Research Question

This subsection outlines how the qualitative (Section 4.1) and quantitative (Section 4.2) phases of the study were methodologically integrated. The aim is to demonstrate that the quantitative dimensions were not developed in isolation.

The six thematic dimensions of the questionnaire (4.2.1–4.2.6) were connected to the seven key themes from the interviews (4.1.1–4.1.7). The quantitative phase was designed to extend and validate the qualitative findings, rather than to introduce new or unrelated constructs.

The following part outlines how specific themes from the qualitative interviews were translated into corresponding elements of the quantitative strand:

- Quantitative Theme 4.2.1 (Definition and Significance of Halal Certification) was connected with qualitative Themes 4.1.1 and 4.1.2, which explored participants' understandings of the term halal and the broader social and religious relevance of

certification. Items Q5 and Q6 were set to capture these foundational views, providing empirical support for Research Question 1 (RQ1);

- Quantitative Theme 4.2.2 (Certification Factors for Muslims) drew directly on Theme 4.1.2, particularly participants' reflections on cultural influences and identity-based consumption. Item Q7 was designed to represent these drivers, continuing the focus on RQ1;
- Quantitative Theme 4.2.3 (Market and Industry Relevance) was derived from Theme 4.1.3, which addressed issues of strategic positioning and market access. Items Q10 and Q11 reflected expectations around business potential, aligning with Research Question 2 (RQ2);
- Quantitative Theme 4.2.4 (Certification Standards) built upon Theme 4.1.4, where participants discussed standards as both regulatory frameworks and tools for credibility. Items Q12–Q14 captured key challenges and expectations, also in relation to RQ2;
- Quantitative Theme 4.2.5 (Halal Certification Processes) was linked to Theme 4.1.6, which focused on implementation procedures, international variability, and operational feasibility. Items Q15–Q17 addressed these concerns, supporting both RQ2 and RQ3; and
- Quantitative Theme 4.2.6 (Holistic Understanding) was derived from Theme 4.1.5, which considered internal knowledge, cross-functional integration, and cultural capability. Items Q19–Q22 reflected these insights, contributing to Research Question 3 (RQ3).

Theme 4.1.7 (Opportunities and Barriers) was partially combined into several quantitative dimensions, most notably Themes 4.2.4 and 4.2.6. While the strategic potential of halal certification was addressed quantitatively, for example through Item Q22, specific implementation barriers such as limited resources or internal knowledge gaps were not captured in the internet questionnaire design. This represents a recognised methodological limitation, which is discussed further in the final chapter.

Matrix 1 (Table 4.1) summarises the alignment between research questions, qualitative subthemes, and related quantitative items. It confirms that all three research questions were methodologically supported by conceptually grounded indicators, ensuring coherence across data collection instruments.

Table 4-1: Matrix – QUAL-QUANT connection by research question

(Rutkowski, 2024)

Research Question (RQ)	QUAL-Questions (Theme)	QUANT-Questions	Focus
RQ1 *What are the religious, cultural, and regulatory requirements for halal chemical and pharmaceutical goods certification?*	Q0 (4.1.1), Q1, Q2, Q3 (4.1.2)	Q5, Q6 (4.2.1) Q7 (4.2.2)	Regulatory environment in Germany
	Q10, Q11 (4.1.5)	Q19, Q20, Q21, Q22 (4.2.6)	Transparency of halal requirements
RQ2 *What are the key challenges and opportunities for the German chemical-pharmaceutical sector in aligning with the requirements of the halal market?*	Q4, Q5, Q6 (4.1.3), Q7, Q8 (4.1.4)	Q10, Q11 (4.2.3) Q12, Q13, Q14 (4.2.4)	Market potential and business justification
	Q12, Q13, Q14, Q15 (4.1.6)	Q15, Q16, Q17 (4.2.5)	Strategic integration into corporate structures
RQ3 *What systematic guidelines can be developed to help the German chemical-pharmaceutical manufacturing sector successfully tap into the potential of the halal market?*	Q17, Q18, Q19 (4.1.7)	Q22 (4.2.6)	Practical implementation of halal certification
	Q6, Q9, Q11, Q14, Q17, Q18, Q19 (4.1.3 bis 4.1.7)	Q13 (4.2.4), Q17 (4.2.5) Q21, Q22 (4.2.6)	Coordination between strategy and execution
	Q10, Q11 (4.1.5)	Q19, Q20, Q21 (4.2.6)	Organisational alignment and internal knowledge

Matrix 2 (Table 2) illustrates the thematic translation from the qualitative findings into the quantitative framework. It shows how narrative content was systematically operationalised into measurable survey dimensions. Key elements such as halal interpretation, certification motivations, and implementation processes were clearly reflected. However, certain organisational factors—such as internal constraints or institutional limitations—only appeared indirectly.

Table 4-2: Matrix – Transfer from qualitative to quantitative themes (Rutkowski, 2024)

Qualitative Theme (4.1.x)	4.2.1 Definition of the term halal *(Q5, Q6)*	4.2.2 Certification factors *(Q7)*	4.2.3 Halal market *(Q10, Q11)*	4.2.4 Certification standards *(Q12-Q14)*	4.2.5 Certification processes *(Q15-Q17)*	4.2.6 Holistic understanding *(Q19-Q22)*
4.1.1 Interpretation of halal	Background understanding	marginal	marginal	marginal	marginal	marginal
4.1.2 Significance of halal certification	Importance and relevance for Muslim consumers	Religious & cultural drivers	marginal	marginal	marginal	marginal
4.1.3 Potential implications	marginal	Emotional and identity-related aspects	Strategic market potential	marginal	marginal	marginal
4.1.4 Certification standards	marginal	marginal	marginal	Perceived barriers and implementation complexity	marginal	marginal
4.1.5 Holistic understanding	marginal	marginal	marginal	marginal	marginal	Organisational and cultural integration
4.1.6 Certification processes	marginal	marginal	marginal	marginal	Feasibility and structural preferences	marginal
4.1.7 Opportunities and bariers	marginal	marginal	marginal	Strategic barriers and complexity factors	marginal	Strategic positioning, innovation potential, and internal capability gaps

Taken together, the two matrices confirm that the mixed-methods design was internally consistent and conceptually well integrated. The alignment between the interview themes and the structure of the questionnaire offers a robust foundation for the synthesis and interpretation developed in Chapter 5.

4.3.2 Initial Cross-Method Synthesis

The synthesis of findings from the qualitative and quantitative phases of the study reveals a strong degree of conceptual alignment across all thematic areas. The qualitative phase generated detailed, practice-based insights from professionals in the field, and the quantitative phase helped to confirm and structure these perspectives across a broader sample of respondents.

Both methodological strands contributed complementary strengths:

- The interviews provided access to rich, in-depth accounts of real-world experiences, highlighting sector-specific challenges and variations in implementation practice; and
- The internet questionnaire data supported these insights with broader patterns, helping to quantify issues, perceived effort, and levels of organisational skill.

Themes placed during the interviews—particularly the religious and cultural meaning of halal (4.1.1–4.1.2), strategic drivers and constraints (4.1.3), and organisational requirements (4.1.5–4.1.6)—were systematically represented in the quantitative items (e.g. Q5–Q7, Q10–Q17, Q19–Q22). This reflects a high level of internal consistency in the study's empirical structure.

In some cases, the two strands placed emphasis on different aspects of the same topic. These differences are not contradictory, but rather offer complementary insights. For instance, operational challenges were described narratively in the in-depth interviews, while the internet questionnaire data captured these indirectly through effort ratings. Similarly, digitalisation was discussed as a promising tool in the interviews (Theme 4.1.6), but was given lower priority by internet questionnaire participants, suggesting a potential gap between strategic expectations and actual implementation focus.

Overall, the interplay between both data sources contributed significantly to the robustness of the findings. The combination of narrative depth and structured measurement offers a strong empirical basis for the triangulated analysis presented in Chapter 5.

4.3.3 Integration and Interpretation of Core Themes

The design of this study was based on a deliberately integrated mixed-methods approach, ensuring that halal certification in the chemical-pharmaceutical sector was examined from multiple, empirically grounded perspectives. By combining qualitative and quantitative data, it was possible to identify, confirm, and prioritise key themes without losing sight of either individual experience or generalisable trends.

In the qualitative phase, the thematic structure was established to serve as a guiding framework for data collection. The resulting seven core themes reflected the complexity and multidimensional character of halal certification, encompassing religious, legal, organisational, and intercultural aspects. A structured coding matrix (Appendix 7.4) supported the categorisation and prioritisation of subthemes. Each was rated using a four-point relevance scale (1 = not important, 4 = very important), which enabled comparability across interviewees and sector contexts.

In the quantitative phase (Section 4.2), the validated qualitative themes served as the conceptual foundation for questionnaire development. Survey items were designed to align closely with the identified thematic areas, resulting in six overarching blocks covering topics such as definitions, market relevance, certification standards, internal processes, and strategic integration. This approach enabled not only the validation of the interview-based insights but also the assessment of their perceived relevance across a broader and more diverse sample.

The combination of both methods ensured that high-priority concerns—such as regulatory uncertainty, resource limitations, and internal knowledge gaps—were systematically captured. Table 4.3 presents the mapping logic and thematic structure underpinning the integration of the two datasets.

Table 4-3: Matrix – QUAL-QUANT connection by research question

Research Question	Qualitative Themes (4.1.x)	Quantitative Dimensions (4.2.x)	Empirical Focus / Key Concepts
RQ1	4.1.1, 4.1.2, 4.1.5	4.2.1, 4.2.2, 4.2.6	Religious understanding, certification relevance, transparency, internal knowledge
RQ2	4.1.3, 4.1.4, 4.1.6	4.2.3, 4.2.4, 4.2.5	Strategic alignment, market potential, certification standards and procedures
RQ3	4.1.5, 4.1.6, 4.1.7	4.2.4, 4.2.5, 4.2.6	Implementation guidelines, operational barriers, integration of strategy and execution

This structured integration shows that the findings are built on a triangulated empirical base. The qualitative coding informed the construction of the quantitative tool, while the survey data

added depth, scale, and broader contextual validation. In several cases, topics were addressed through both narrative insight and quantitative indicators, which helped to ensure multi-layered understanding.

The scoring and mapping logic applied across both phases supports the identification of priority areas for further analysis. These core themes—selected for their empirical strength, relevance across sectors, and consistency between data types—now form the analytical foundation for the final synthesis and recommendations in Chapter 5.

4.4 Chapter Summary

Chapter 4 established the empirical foundation of this study and followed a sequential mixed-methods approach. The first phase consisted of a qualitative investigation based on in-depth interviews, which resulted in the identification of seven central thematic areas. These themes reflect the complexity and context-specific nature of halal certification in the chemical-pharmaceutical sector, encompassing religious, cultural, strategic, and operational dimensions.

In the second phase, six quantitative themes were examined through an internet-based questionnaire. This approach made it possible to validate, structure, and prioritise the previously identified themes across a broader industry sample. The quantitative findings not only confirmed key patterns, but also offered sector-specific differentiation and insight into thematic priorities.

Section 4.3 brought the two strands of data into dialogue and demonstrated a high degree of methodological coherence. The matrices presented in that section illustrate how the qualitative and quantitative instruments were methodologically connected, and how their integration contributed to the conceptual consistency of the study. Both thematic overlaps and divergences were systematically captured, enabling a nuanced understanding of the research questions.

Taken as a whole, Chapter 4 confirms that the study's empirical design was both conceptually sound and methodologically robust. The findings presented here provide a solid basis for the triangulated analysis and practice-oriented synthesis in Chapter 5, where the broader implications of the results are critically examined in light of the study's strategic objectives.

5 DISCUSSION OF THE RESULTS

5.1 Contextualisation of Findings Considering Research Questions

The purpose of this section is to systematically relate the empirical findings from Chapter 4 to the three research questions (RQ1–RQ3). The structure follows the framework developed in Section 4.3, ensuring that qualitative and quantitative results are aligned and integrated. For contextual depth, theoretical foundations from Chapter 2 are merged—particularly the analysis of international halal standards and the operational framework provided by the halal checklist.

The qualitative findings are based on a structured coding process, which enabled the systematic identification, rating, and interpretation of interview themes.

At the core of this analysis is the question of how industrial stakeholders interpret and differentiate between regulatory requirements, implementation challenges, and market opportunities. The findings presented in this section provide the empirical foundation for the triangulated synthesis (Section 5.2), the discussion of key results (Section 5.3), and the implementation guideline outlined in Section 5.4.

5.1.1 Results-Based Assignment to RQ1–RQ3

RQ1: What are the religious, cultural, and regulatory requirements for halal certification of chemical and pharmaceutical goods?

The empirical findings demonstrate that halal requirements, when applied to the chemical-pharmaceutical sector, extend well beyond symbolic observance or generic ethical claims. Rather, companies perceive halal as a complex system of overlapping religious, regulatory, and operational conditions, which often conflict or remain underdefined:

- In the in-depth interviews, respondents repeatedly highlighted the inconsistency in the interpretation of Islamic halal norms across different national certification bodies. This inconsistency complicates practical implementation, particularly in the assessment of critical ingredients (e.g. ethanol, enzymes) and cleansing procedures (cf. 4.1.4). These insights were derived from a coded and relevance-weighted analysis of in-depth interview data with average scores of 3.0 and above in related subthemes;
- The quantitative analysis in Subsection 4.2.1 confirmed the qualitative findings: 75% of respondents in the chemical and 70% in the pharmaceutical sector correctly defined halal in accordance with Islamic principles. Yet, open-ended responses revealed notable confusion, especially around excipients, biotechnological components, and the

distinction from haram. These results underscore the need for precise, standardised criteria and confirm the relevance of halal as both a religious-cultural and strategic concept;

- The literature analysis (Sections 2.2 and 2.4) confirms that while frameworks such as MS 2424 (Malaysia) or HAS 23000 (Indonesia) offer structural guidance, they are variably interpreted and implemented by certifying bodies. A globally harmonised standard, for example one based on OIC/SMIIC, has not yet materialised; and
- The halal checklist developed in Section 2.5 operationalises these abstract requirements into concrete criteria—serving as a methodological bridge between religious norms and technical implementation.

In sum, the successful implementation of halal certification requires not only regulatory alignment, but also clarity, auditability, and cross-sector comparability, as addressed by the checklist.

RQ2: What are the key challenges and opportunities for the German chemical-pharmaceutical sector in aligning with the requirements of the halal market?

The findings suggest that halal is increasingly recognised by companies as a strategic market lever, though various operational barriers continue to hinder consistent and scalable implementation:

- The qualitative data reveal that a comprehensive understanding of halal is often missing. Within the chemical-pharmaceutical sector, there are clear deficits in terms of responsibility, training, and strategic prioritisation. Nonetheless, interviewees pointed to halal's market potential, especially in relation to export markets in Asia and Africa (cf. Subsections 4.1.3, 4.1.5). The prioritisation of these themes was based on high relevance scores within the coding matrix (Appendix 7.3), with average ratings consistently above 3.0 across related items, indicating a shared recognition of opportunity despite implementation constraints;
- Quantitative results show that a majority of respondents from the chemical and pharmaceutical sectors view halal certification as resource intensive. Critical obstacles identified include the lack of standardisation, extensive documentation requirements, and insufficient management support (cf. 4.2.4, 4.2.5);
- Literature (Pratikto *et al.*, 2021; Dinar Standard, 2023) explains that in many countries halal certification is legally mandated, whereas German companies operate within

voluntary systems—despite high expectations for international recognition. This limits their economic potential; and

- The halal checklist reflects these practical challenges and provides a structured tool for process allocation, responsibility distribution, and QMS integration—particularly in settings where internal resources are constrained.

Taken together, the findings underscore that halal certification suffers from under-institutionalisation. Addressing this requires tools like the checklist to support capability building, as well as integration strategies as outlined in Section 5.4.

RQ3: What systematic guidelines can be developed to help the German chemical-pharmaceutical manufacturing sector successfully tap into the potential of the halal market?

This third research question addresses the design of an applicable implementation guideline that bridges regulatory obligations with organisational routines:

- Qualitative data demonstrate a demand for a clearly structured implementation plan involving all relevant stakeholders—from executive leadership and production to procurement and external partners. The coding structure revealed a recurring emphasis on practical needs (e.g. role clarity, audit), with many high-relevance entries (levels 3–4) pointing to gaps in current routines (cf. Appendix 7.4.1);
- Quantitatively, over 80 percent of participants emphasised the relevance of concrete implementation tools, such as checklists or standardised audit protocols (cf. 4.2.5, 4.2.6);
- The literature (Kamaruddin et al., 2016; Suhaimee, Abdullah and Alias, 2019) highlights that a well-structured certification process can not only ensure compliance, but also increase process efficiency—provided that practical, user-friendly guidelines exist; and
- The implementation guideline developed in Section 5.4 builds on these demands and combines the halal checklist with a broader, multi-level strategy approach. It incorporates regulatory clarification, market analysis, and operational rollout.

The results clearly show that practical, sector-appropriate tools are essential. The guideline offers an integrated solution that reflects both qualitative insights and quantitative needs.

5.1.2 Visualised Overview of Findings

To ensure traceability, a structured matrix was created linking the qualitative and quantitative findings from Chapter 4 to the three research questions (RQ1–RQ3). Supported by the theoretical foundations in Chapter 2, the matrix offers an integrated overview of the empirical

evidence. The halal checklist from Section 2.5 and the implementation guideline from Section 5.4 jointly serve as reference frameworks for chemical-pharmaceutical companies, complementing Subsection 5.1.1 by visually illustrating how in-depth interview data, internet questionnaire results, and literature were triangulated.

Table 5-1: Matrix of triangulated findings, research questions and the halal guideline

Research Question	Qualitative Findings (Section 4.1)	Quantitative Findings (Section 4.2)	Theoretical Framework (Chapter 2)	Halal Checklist (Section 2.5)	Halal Guideline (Section 5.4)
RQ 1: Requirements	e.g. Substance ambiguity (ethanol, enzymes); inconsistent certifiers; unclear processes	e.g. 75% / 70% correct definition; open-text shows uncertainty	Varying interpretations (Section 2.4); national differences	Checklist builds on global standards; supports alignment between religious and technical dimensions	Establishing regulatory transparency: Translating religious requirements into technical specifications; cross-sector comparability enabled
RQ 2: Challenges & Opportunities	e.g. Lacking internal knowledge; high documentation; market potential recognised	e.g. 67% lack resources; 61% unclear rules; >70% see opportunity	Sections 2.6–2.9: High demand, weak mutual recognition	Checklist reflects practical barriers (e.g., internal capacity gaps); supports prioritisation based on sector-specific needs	Developing the case and integrating strategy; emphasis on internal capability building and opportunity recognition
RQ 3: Guideline	e.g. Demand for systematic approach; external expertise suggested	e.g. >80% want tools; high demand for guidance	Sections 2.5 & 2.10: Missing national tools, global approach	Checklist operationalises requirements into auditable actions; supports strategic implementation	Framework analysis in Germany and operational implementation; multi-level guidance structure suggested

The matrix is intended to:

- Clarify the thematic coherence between qualitative and quantitative findings within a framework;
- Illustrate how the halal checklist translates regulatory and religious requirements into verifiable, audit-ready indicators;
- Demonstrate how the implementation guideline builds upon the halal checklist to provide a modular and scalable execution approach; and
- Position the implementation guideline as an empirically grounded response to RQ3, reflecting the triangulated research design.

The matrix draws on coding categories from Section 4.1 (qualitative), evaluation dimensions from Section 4.2 (quantitative), and the theoretical framework from Chapter 2. It has been further refined using the structure of the implementation guideline in Section 5.4. An extended version is available in Appendix 7.5.

The matrix confirms that all three research questions were addressed using a robust, multidimensional evidence base. The results are not only methodologically grounded, but also conceptually embedded, enabling a coherent and applicable interpretation:

- RQ1 – There is a clear intersection between religious requirements, regulatory practices, and technical implementation. The halal checklist translates these into clear criteria and supports comparability;
- RQ2 – Strategic opportunities and organisational barriers become evident—particularly through the combined evidence from in-depth interviews and internet questionnaire. The checklist supports identify priority fields for action, while the guideline supports strategic alignment; and
- RQ3 – The implementation guideline was developed on the basis of qualitatively identified needs and quantitatively validated demands. It translates core insights into a modular, context-sensitive framework for operational application.

The matrix serves as the methodological basis for the triangulation discussion in Section 5.2, which explores how linking qualitative and quantitative perspectives supports both validation and deeper interpretation. It also prepares the basis for the development of practical and evidence-based recommendations.

5.2 Triangulation: Linking Methods

The assignment of findings to the three research questions demonstrates that neither the qualitative nor the quantitative strand alone is sufficient to fully capture the complexity of halal certification in the chemical-pharmaceutical sector. The strength of this study lies in its capacity to integrate both perspectives, thereby offering a more comprehensive and nuanced understanding of the research problem.

This section explores how the mixed-methods design has contributed to the explanatory depth of the results. It identifies patterns of convergence and divergence across the data sources and explains how these insights are translated into structured instruments, particularly through the halal checklist and the implementation guideline.

The integration is grounded in a systematic coding framework developed for the qualitative strand, which ensured consistent thematic structuring and allowed direct mapping to quantitative questionnaire dimensions.

5.2.1 Consistencies and Alignment

Across the core thematic dimensions, a number of consistent patterns emerged between the interview-based qualitative findings and the results of the internet questionnaire. These thematic overlaps support the study's internal validity and reinforce the reliability of its findings:

- Understanding of halal: Both qualitative and quantitative data clearly indicated that halal is not perceived by companies solely as a ritual-religious concept. Rather, it is increasingly associated with values such as trust, transparency and ethical quality, not only within Muslim-majority markets but also among broader consumer segments (see 4.1.1; 4.2.1). This interpretation is supported by global market literature (Section 2.8);
- Cultural and religious relevance: Both data sources confirmed that religious identity, family traditions, and broader cultural orientation strongly influence the perceived legitimacy of halal certification. These dimensions were highlighted in the interviews (e.g. 4.1.2) and confirmed by responses to items Q7 and Q20; and
- Demand for international standardisation: One of the most consistent findings was the widespread call for harmonised, clearly defined and auditable halal criteria. Over 70% of questionnaire participants supported this position—a result that aligns not only with the interview data (4.1.4; 4.1.6), but also with existing scholarship (Suhaimee, Abdullah and Alias, 2019; Hayat, Kumar and Sazili, 2023). The halal checklist reflects this demand by operationalising core requirements into a globally informed, technically auditable format.

These areas of consistency suggest that core concerns and expectations are shared across the sector and reflect an emerging consensus on what constitutes credible, scalable halal practice.

5.2.2 Differences and Complementary Perspectives

While there were strong areas of agreement, the data sets also revealed notable differences, particularly regarding priorities, perceived risks, and suggested implementation pathways:

- Digital tools and traceability: The qualitative data, particularly from interviewees with regulatory or technical backgrounds, revealed reservations about the role of digitalisation in the halal context. These concerns were primarily related to data protection and limited acceptance in more conservative markets (4.1.6). In contrast, participants in the internet questionnaire emphasised the potential of digital tools to facilitate documentation processes and improve audit preparation (Q15, Q16). This divergence suggests a difference in perspective between strategic-level caution and operational-level pragmatism;
- Sectoral variation: The interviews made clearer distinctions between the chemical and pharmaceutical sectors, particularly in terms of certification experience and supply chain structure (4.1.3; 4.1.6). The questionnaire, by contrast, applied cross-sectoral

items to ensure comparability, which limited its ability to reflect these sector-specific nuances in detail; and

- Strategic recommendations: The qualitative strand generated concrete, actionable suggestions, such as embedding halal expertise in advisory roles or tailoring training formats to specific job profiles (4.1.5; 4.1.7). These operational insights were not captured by the questionnaire, but they form an essential part of the implementation logic introduced in Section 5.4. The implementation guideline responds to these insights with a modular, stakeholder-oriented structure that addresses both strategic needs and operational processes.

Rather than contradictions, these differences reflect the complementary value of each method. The qualitative findings add strategic and contextual nuance, while the quantitative data highlight patterns and sector-wide priorities.

5.2.3 Synthesis: Converging Insight Patterns

The integration of both methodological strands produces a condensed synthesis of findings, allowing for the interdisciplinary answering of all three research questions:

- RQ1 – Requirements: There is strong consensus across methods that halal certification requires internationally consistent and religiously sound standards. The halal checklist developed in Section 2.5 directly addresses this need by translating abstract regulatory expectations into concrete elements, thus serving as a methodological backbone;
- RQ2 – Challenges and opportunities: The interviews revealed internal structural deficits, including unclear role allocation and insufficient training provision. These findings were corroborated by the internet questionnaire, which highlighted similar barriers to effective implementation. The checklist supports companies in recognising these gaps, while the guideline outlines how to overcome them through structured integration strategies; and
- RQ3 – Practical guidelines: The combined data informed the development of a multi-step, modular implementation guideline. This framework integrates regulatory, technical, and organisational aspects and draws from both qualitative recommendations and quantitative tool demand (see Section 5.4).

In sum, this synthesis demonstrates that the integration of methods serves not only as a validation mechanism but also enables the development of an actionable, empirically grounded, and sector-adaptable implementation framework.

5.3 Discussion of Key Findings

This section brings together the triangulated findings from Sections 5.1 and 5.2 and develops a consolidated interpretation of the results. The aim is to examine the implications for academic research, industrial application, and regulatory practice. The discussion is structured around the three research questions (RQ1–RQ3), with particular focus on the interface between religious principle, regulatory complexity, and organisational implementation capacity—a central tension in the halal certification landscape.

5.3.1 Halal as a Religious, Cultural, and Regulatory Framework (RQ1)

The findings show that halal certification in the chemical-pharmaceutical industry is not a one-dimensional compliance issue but a layered and intersecting framework of religious, regulatory, and operational demands.

The qualitative interviews (Subsections 4.1.1, 4.1.2, 4.1.4) exposed significant confusion around the interpretation of halal-critical elements. Particularly sensitive were ingredients such as ethanol and enzymes, as well as genetically modified components and cleaning standards. Interviewees frequently cited the lack of standardised rulings and inconsistent certification practices across national contexts as major operational obstacles.

These observations were empirically supported by the internet questionnaire data (Subsections 4.2.1, 4.2.2, 4.2.4), where many respondents highlighted definitional vagueness, difficulties in ingredient categorisation, and a lack of technically verifiable criteria. Open comments further underscored irritation with unclear thresholds and contradictory audit expectations.

The comparison of international certification regimes (Sections 2.3–2.4) shows a fragmented landscape: while countries such as Malaysia (MS 2424), Indonesia (HAS 23000), and the UAE (ESMA) offer detailed national guidelines, these slightly differ in scope and emphasis. A globally accepted halal standard, such as one based on OIC/SMIIC, is still lacking, further complicating market access and cross-border audit equivalency.

The checklist introduced in Section 2.5 directly addresses these fragmentation issues. It condenses key requirements into 21 operational audit points, offering sector-sceptical clarity and comparability. Covering critical areas such as ingredient approval, logistics, documentation, and GMO handling, it creates a harmonised tool to reduce vagueness and promote traceability.

In the German context, this instrument enables the translation of abstract religious requirements into auditable technical routines—bridging regulatory intent and operational capacity. It strengthens compliance reliability across diverse organisational settings.

5.3.2 Opportunities and Organisational Barriers (RQ2)

The second research question addressed the opportunities and barriers of German companies to adopt halal certification effectively. The results reveal a clear gap.

The qualitative interviews (Subsections 4.1.3, 4.1.5, 4.1.7) identified structural weaknesses within companies, including unclear role distribution, fragmented responsibility, and limited staff training. In several cases, halal was perceived not as a strategic opportunity but as a regulatory hurdle—where halal relevance was often not yet embedded in corporate routines.

The quantitative data (Subsections 4.2.3, 4.2.4) reinforced this picture. While three out of four respondents acknowledged significant market growth, particularly in Muslim-majority countries, nearly two-thirds also reported high or very high implementation effort. The chemical-pharmaceutical sector stood out for its perception of complexity and lack of internal resources.

Literature reviewed in Sections 2.6–2.9 confirms that halal is more than a legal requirement. It functions as a trust signal, associated with ethical production, quality assurance, and cultural alignment. Studies by Abdul *et al.* (2014) and Pratikto *et al.* (2021) demonstrate that even non-Muslim consumers increasingly interpret halal as an indicator of product integrity.

The halal checklist provides a concrete starting point for companies to reduce internal uncertainty. It supports operational planning by offering clarity in role allocation, internal responsibility structures, and compatibility with standards such as ISO or GMP.

It also functions as a strategic instrument, helping firms position halal as a value-adding component of market differentiation—rather than a heavy obligation.

Considering this, the study recommends a stronger focus on market evaluation, strategic framing of halal as a value-adding proposition, and the integration of certification into broader governance structures. This integration is reflected in the structure of the implementation guideline (Section 5.4), which builds directly on checklist principles and expands them into a multi-level implementation approach.

5.3.3 Implementation: Guidelines and Practical Recommendations (RQ3)

The third research question focused on how a systematic, company-compatible halal implementation model can be designed. The empirical findings point to a clear need for structured, stepwise guidance, particularly among companies with limited internal expertise.

The qualitative interviews (Subsections 4.1.6 and 4.1.7) highlighted the importance of external support. Companies lacking internal halal expertise, particularly those led by non-Muslim management, expressed considerable interest in consultancy support and externally developed implementation frameworks. Digitalisation and documentation tools were considered helpful, but only when embedded in broader training and process structures.

This was confirmed by the quantitative data (Subsections 4.2.5 and 4.2.6): over 80% of participants stressed the importance of efficient, standardised implementation models, with particular interest in checklists, staff training, and audit integration.

Taken together, the findings support a stepwise implementation approach that structures organisational action across the following five activities:

1. First, companies must analyse their internal conditions and the broader societal context within Germany. This includes regulatory frameworks, market requirements, and cultural expectations;
2. Second, building on this, a transparent engagement with religious requirements is essential to ensure alignment;
3. Third, a market evaluation and business case must be developed, clarifying economic opportunities and risks;
4. Fourth, on this basis, halal can be strategically embedded within the company, for instance, through internal policies, role allocation, and target systems; and
5. Fifth, only at the final stage does operational implementation follow, supported by digital instruments, training modules, and audit-ready checklists.

The checklist from Section 2.5 and the practical guideline in Section 5.4 form the dual core of this structure. While the checklist delivers regulatory clarity and auditable criteria, the guideline operationalises these into a flexible, scalable process model tailored to chemical-pharmaceutical contexts.

Together, they enable companies to self-assess, plan strategically, and interface effectively with external auditors—while aligning with broader quality and compliance frameworks.

Effective halal implementation requires structured, auditable, and culturally resonant guidance. The findings of this study clearly support the development of such an approach – one that not only addresses regulatory challenges but also ensures strategic coherence and practical feasibility. A stepwise methodology fosters a sustainable and scalable implementation process. The integration of external service providers, as envisioned in the guideline, may offer additional relief—particularly for resource-limited or compliance-sensitive environments.

5.4 Guideline for the Chemical-Pharmaceutical Sector

Building on the implementation logic outlined in the prior sections, this part presents the practice-oriented guideline that operationalises the response to RQ3. It translates the identified challenges into a modular, adaptive framework, tailored to the specific needs of companies in the chemical-pharmaceutical sector.

The foundation of the guideline is derived from the triangulated findings of in-depth interviews (Section 4.1), the quantitative internet questionnaire (Section 4.2), and the comparative regulatory analysis (Sections 2.3–2.4). The overarching goal is to reduce complexity and uncertainty in halal certification by translating it into concrete, auditable and process-compatible steps.

The challenges—such as unclear religious expectations, fragmented certification regimes, and weak organisational anchoring—are addressed through five interconnected activity fields. These are designed for flexible application depending on a company's halal maturity level and strategic positioning.

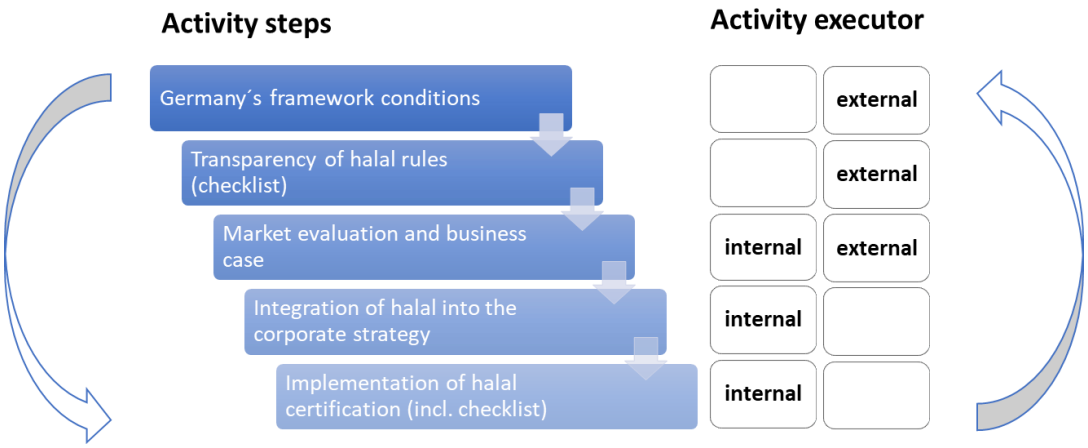


Figure 5-1: Guideline for the chemical-pharmaceutical sector (Rutkowski, 2024)

A key strength of the model lies in its compatibility with existing QMS frameworks such as ISO 9001 or GMP. The halal checklist (Section 2.5) serves as a central interface, bridging religious-

normative requirements with operational realities. The checklist transforms abstract doctrine into structured audit logic, ensuring practical feasibility.

The five activities (Subsections 5.4.1–5.4.5) provide hands-on guidance in the following areas:

1. Germany´s framework conditions (Activity 1)
2. Transparency of halal rules (Activity 2)
3. Market evaluation and business case (Activity 3)
4. Integration of halal into the corporate strategy (Activity 4)
5. Implementation of halal certification (Activity 5)

In addition, Subsection 5.4.6 defines clear role distributions between internal resources and external service providers—a decisive success factor in regulated industries.

This guideline is not intended as a strict protocol, but as an adaptive toolkit that supports both market entry and professionalisation. At its core, the guideline positions halal as a strategic transformation process, not merely a certification procedure. It locates halal at the intersection of religious compliance, quality assurance, and international competitiveness.

5.4.1 Activity 1: Germany´s Framework Conditions

The first activity of the implementation guideline addresses the societal, political, and economic context within which halal certification must be operationalised in Germany. It forms the strategic starting point for all subsequent activities, as halal must be understood not only as a technical requirement but as a normatively and culturally embedded concept.

The findings from the in-depth interviews (Subsections 4.1.1, 4.1.3, 4.1.7) highlight a pronounced uncertainty concerning the societal perception of halal in Germany. Participants frequently described halal as a culturally sensitive issue, often subject to polarised public discourse. At the same time, halal is increasingly regarded as an ethical quality marker, gaining relevance beyond religious target groups.

This perspective is corroborated by the internet questionnaire data (Subsections 4.2.1, 4.2.2), which indicated that respondents lacked reliable information on the socio-political embedding of halal in Germany.

This constellation of findings illustrates that companies in the chemical-pharmaceutical sector generally possess the technical and organisational competencies required for implementation, but often lack a consolidated understanding of the societal and political landscape into which halal certification is embedded. A robust assessment of public discourse and regulatory

developments is therefore a prerequisite for credible halal communication and strategic positioning. This requires a structured context analysis that includes:

- Societal attitudes toward halal products and Islamic culture;
- Political and regulatory trends at federal and EU levels;
- Sector-specific relevance of halal in public relations and brand positioning; and
- Discursive tensions between secularism, pluralism, and religious freedom.

Given the interdisciplinary nature of this assessment, external expertise should be consulted, for example, through academic institutes specialising in Islamic studies, intercultural communication, or political science. These partners can provide objective evaluations of the socio-political climate and inform strategic corporate decisions.

The analysis of Germany's contextual conditions is not a preparatory side note, but an integral part of the halal strategy. Companies that understand and proactively integrate these factors early on are more likely to gain societal acceptance, regulatory resilience, and cultural alignment in the halal market.

5.4.2 Activity 2: Transparency of Halal Rules

The second core activity focuses on establishing both substantive and procedural transparency regarding halal requirements.

As highlighted in the in-depth interviews (Subsections 4.1.2 and 4.1.4), the lack of consistency in religious guidelines remains a primary barrier to implementation in the chemical-pharmaceutical industry. Respondents often noted that the central challenge lies less in technical execution and more in the ambiguous interpretation of religious rulings—particularly concerning critical substances such as ethanol and enzymes.

The internet questionnaire (Subsections 4.2.2 and 4.2.4) confirmed this issue: approximately 70% of participants reported an absence of clear, practical criteria for halal assessment in industrial contexts. This uncertainty is especially pronounced among internationally active companies, which operate in a fragmented regulatory landscape shaped by over 165 active halal certification bodies worldwide.

To address this complexity, a structured halal checklist was developed in this study. It consolidates and operationalises the strictest requirements from key halal markets (Malaysia, Singapore, Indonesia, Turkey, UAE) into a practical tool (see Table 5.2).

The checklist includes both substantive dimensions (e.g. prohibition of ethanol) and procedural elements (e.g. segregated storage, documentation practices, and audit protocols). An extended version of the checklist, including detailed country requirements, is provided in Appendix 7.6.

Table 5-2: Checkbox for chemical-pharmaceutical sector to fulfil strictest halal-requirements (Rutkowski, 2024)

Category	Area	Strongest halal-requirements	Fullfilled
Raw materials / ingredients	Animal-based (aquatic animals)	Raw materials / ingredients from aquatic animals require halal-compliant sources, halal certificate for these raw materials is required, documentation and regular review of supply chains	yes / no
	Animal-based (land animals / predators)	Raw materials / ingredients must be slaughtered in accordance with Islamic regulations, halal certificate required for slaughterhouses and products, regular checks	yes / no
	Ethanol in the recipe	Production without the use of alcohol in the recipe, halal	yes / no
	Petrochemical raw materials	Halal certificate required for raw materials, focus on	yes / no
	Slaughter (animals)	Halal-compliant slaughtering methods and halal certificate for raw materials required, focus on Islamic slaughtering regulations, documentation of processes	yes / no
	Slaughter (tools)	halal conformity of slaughtering processes necessary, high priority given to Islamic slaughtering regulations, process-	yes / no
	Vegetable-based	Halal certificate required for raw materials, focus on	yes / no
Logistics	Product filling and loading	No contamination with haram, halal certificate required for	yes / no
	Product storage	halal conformity required for the storage of products, focus on separate storage, focus on compliance with	yes / no
	Product transport to the customer	halal conformity of transport routes required	yes / no
	Raw material procurement	Procurement of raw materials from halal-compliant sources, halal certificate required for raw materials, strict	yes / no
	Raw material storage	halal conformity required for the storage of raw materials, focus on separate storage, focus on compliance with	yes / no
Manufacturing	Ethanol in the process	No ethanol residues in the end product, halal certificate as	yes / no
	Product manufacture	Overall process must be halal-compliant, raw materials and products must be halal-certified	yes / no
	Product packaging	Packaging must be halal-certified	yes / no
	Product plants	Overall process must be halal-compliant, product must be halal-certified, focus on compliance and audits	yes / no
Audits & documentation	Audits	Part of the certification process, halal certification required	yes / no
	Overall processes and work instructions	Overall process must be halal-compliant, product must be halal-certified, training courses	yes / no
Genetic modified organisms & Enzymes	Enzymes	halal certification of enzymes required	yes / no
	Genetically modified organisms	halal certification of GMO materials required	yes / no

The halal checklist serves several key functions:

- It translates normative religious principles into clear, auditable indicators;
- It facilitates objective self-assessment for companies with limited halal experience; and
- It can be used for supplier engagement, internal training, and audit preparation.

In addition, companies are advised to maintain ongoing dialogue with recognised halal authorities such as JAKIM (Malaysia), MUIS (Singapore), or BPJPH (Indonesia). Engagement with these institutions allows early identification of regulatory changes and reduces the risk of misinterpretation or non-compliance.

Improving transparency in halal requirements is not only a technical necessity but a core condition for implementation. It equips companies to navigate the intersection of religious expectations, regulatory frameworks and technical feasibility, and thus provides the structural foundation for the entire implementation guideline.

5.4.3 Activity 3: Market Evaluation and Business Case

The third activity of the implementation guideline aims to systematically assess the economic potential of halal certification within the chemical-pharmaceutical sector and to develop a robust business case. Building on the insights from Section 2.8 and the empirical findings, it becomes evident that halal is increasingly functioning not merely as a religious consumer standard but as a strategic trust and differentiation label—especially in global markets with growing Muslim consumer bases.

In-depth interviews revealed that while many companies recognise halal-related market opportunities, they often lack a systematic cost-benefit assessment. Export-oriented companies identified halal as a potential door opener for markets such as Malaysia or Indonesia, yet expressed uncertainties about regulatory requirements, cost structures, and long-term profitability. In most cases, halal had not yet been integrated into strategic market or product evaluations.

These findings were supported by the internet questionnaire: while most respondents described the halal segment as attractive or forward-looking (Subsection 4.2.3), there was little evidence of detailed analysis or strategic implementation.

The aim of this activity is to assess halal certification from a cost-benefit perspective. The proposed business case encompasses three main evaluation dimensions:

- Market access potential: Identifying high-potential target markets based on indicators such as Muslim consumer purchasing power, regulatory openness, and export barriers. According to the Global Islamic Economy Indicator (Dinar Standard, 2023), Malaysia and Indonesia rank among the most dynamic halal growth markets with considerable import demand—especially in the pharmaceutical sector.
- Reputation and differentiation effects: Analysing the perceived brand value of halal positioning. Studies (e.g. Azam and Abdullah, 2020) show that halal products are increasingly viewed by non-Muslim consumers as quality and ethically sound offerings. This reputation can serve as a differentiating factor in ratings and sustainability strategies.
- Cost structure and process impact: Identifying one-time and recurring costs related to certification, audits, process modifications, and training, and comparing these with expected revenue growth. This includes evaluating whether existing QMS structures (e.g. ISO 9001, GMP) can be leveraged to reduce implementation costs.

Given the regulatory heterogeneity of international halal markets, it is advisable to consult external market analysts or industry-specific consultancy services—especially where internal resources are limited. These experts can provide region-specific knowledge and deliver reliable data on market size, target group behaviour, and certification barriers. In parallel, halal should be systematically integrated into existing business development processes such as portfolio analyses or international expansion strategies.

The next activity builds on this economic foundation and focuses on embedding halal certification into overarching corporate strategy.

5.4.4 Activity 4: Integration of Halal into Corporate Strategy

The fourth activity of the implementation guideline focuses on embedding halal certification strategically within the broader corporate management framework. Building on the preceding market evaluation and business case (Subsection 5.4.3), this step underscores that halal should not be treated as a stand-alone or peripheral initiative, but as a fully integrated, cross-functional commitment aligned with long-term business goals.

The in-depth interviews (Subsections 4.1.5, 4.1.6, 4.1.7) showed that successful implementation depends strongly on the institutional anchoring of halal-related responsibilities and priorities. Participants frequently pointed to unclear responsibilities, low visibility at senior levels, and a lack of defined objectives as core barriers—even where commercial potential had already been acknowledged. These findings were further supported by the internet questionnaire.

Strategic integration should consider the operational and structural characteristics of the chemical-pharmaceutical sector. This may involve several key dimensions:

- Establishing clear responsibility structures: Defined roles are essential and must function as operational bridges between procurement, production, quality assurance, and external certification bodies;
- Embedding halal into quality management systems (QMS): The halal checklist developed in this study (Section 2.5) acts as a practical link between religious requirements and industrial procedures. Its integration into existing QMS frameworks such as ISO 9001 or GMP enhances consistency, auditability, and process control. Related performance indicators can be incorporated into corporate reporting or ESG strategies;
- Developing intercultural competence: The qualitative data indicate that cultural awareness is often underestimated. Targeted training, particularly for staff in

procurement, quality management and production, can foster acceptance and reduce friction at key points of implementation; and

- Integrating halal into supplier management: Companies with advanced alignment already include halal requirements in supplier selection and contracting. The checklist provides structured, audit-ready criteria that support standardisation along the supply chain.

Strategic integration is not a one-time activity, but an iterative process, requiring regular updates and alignment with evolving regulatory, cultural, and market environments. Institutional governance structures are essential: without defined roles and cross-departmental coordination, strategic objectives risk remaining abstract. The formal establishment of a halal steering committee, or dedicated halal board, is strongly recommended to ensure organisational accountability and operational consistency.

Finally, integrating halal certification into corporate strategy does more than meet regulatory expectations. It strengthens a company's ethical positioning, enhances internal alignment, and can serve as a visible expression of long-term corporate responsibility. When properly embedded, halal becomes not just a certification objective, but a strategic asset with relevance across the value chain.

5.4.5 Activity 5: Implementation of Halal Certification

The fifth and final activity of the guideline focuses on the operational application of halal requirements in routine business practice. It provides the operational foundation for strategic integration and translates regulatory, technical, and cultural expectations into structured internal processes.

The in-depth interviews (Subsection 4.1.6) highlighted that successful implementation is determined at critical operational interfaces, such as material segregation, cleaning documentation, and logistics. Frequent barriers included unclear procedures and missing standardisation, findings confirmed by the internet questionnaire.

Based on the checklist developed in this study (Section 2.5; Table 5.2), five core areas of operational action are recommended:

- Manufacturing adjustments and process validation: Halal-compliant manufacturing often requires physical or procedural separation of critical inputs, such as separate storage, dedicated equipment, or validated cleaning cycles (cf. MS1500, HAS23000);

- Embedding the halal checklist into operational audits: The checklist should be fully integrated into existing internal control systems, ideally aligned with established ISO or GMP routines. Its structure allows for direct application in audit protocols;
- Staff training and internal communication: Training should cover both technical and religious-cultural aspects (e.g. acceptable processing aids), fostering a shared understanding and reducing error rates;
- Supply chain oversight and supplier audits: Suppliers of sensitive materials, like enzymes, pose significant compliance risks. The checklist enables structured assessments and standardised supplier requirements; and
- Transitional solutions: For companies without full halal infrastructure, interim measures such as contract manufacturing, segregated production batches, or documented cleaning routines can offer flexible entry points while internal capabilities are developed.

Operational responsibility is primarily assigned to departments such as production, quality management, and logistics. Central coordination—ideally through a designated halal officer or an interdisciplinary halal team—is essential. External partners may support specific areas such as process validation or audit expertise.

This final activity transforms halal into a routine, auditable business function, anchoring compliance in operational procedures. At the same time, synergies with existing management systems can minimise effort and generate process efficiencies.

5.4.6 Allocation of Roles between Internal Resources and External Service Provider

The successful implementation of the guideline requires a deliberate and well-balanced distribution of tasks, competencies, and oversight. Central to this is the effective integration of internal capacities and targeted external expertise, particularly in areas where in-house knowledge is still developing.

Findings from the in-depth interviews (Subsection 4.1.6) indicate that many companies currently lack the internal personnel or technical expertise to conduct halal certification independently. At the same time, there is clear hesitancy to fully outsource the process, reflecting concerns about strategic control and credibility. This tension highlights the need for a phased, shared approach.

Based on the structure introduced in Section 5.4, the five implementation activities can be systematically assessed for internal versus external feasibility. Table 5.3 summarises the recommended role allocation across each activity area:

Table 5-3: Assignment according to fields of activity of the implementation guideline

Activity	Primary Implementation	Justification
1 – Analysis of framework conditions	External	Requires socio-political, regulatory and intercultural expertise.
2 – Transparency of halal rules	External (with internal support)	Religious and legal interpretations require specific expertise.
3 – Market analysis & business case	Internal or External	Regional market knowledge and regulatory access demand specialized expertise.
4 – Strategic integration	Internal (with optional consultation)	Must be embedded in company-specific management systems.
5 – Operational implementation	Internal (with targeted support)	Closely linked to quality management and process structures.

In summary, external service providers should be selected carefully and engaged purposefully. Key qualification criteria include:

- Accreditation by recognised halal authorities (e.g. JAKIM, MUIS, ESMA);
- Demonstrated experience in the chemical, pharmaceutical or cosmetics sectors;
- Cultural and religious competence appropriate to the target markets; and
- Expertise in aligning halal requirements with QMS and audit processes.

Typical areas of involvement for external partners include:

- Issuing non-binding Islamic legal opinions (fatwas) or religious assessments;
- Comparing and interpreting international halal regulations;
- Delivering internal training and capacity-building workshops;
- Supporting audit preparation and document review; and
- Advising on export strategies and market access pathways.

Implementing halal certification is a transformative process that cuts across all organisational layers. A clearly defined and realistic division of responsibilities between internal teams and vetted external partners ensures both credibility and sustainability. This collaborative model supports resource efficiency, strategic coherence, and long-term viability of halal integration.

5.5 Holistic Business Case and the Integration of Non-Economic Factors

While traditional business cases focus on measurable outcomes, halal certification requires a broader, integrated logic to capture both tangible and intangible value dimensions.

The implementation of halal certification in the chemical-pharmaceutical sector touches on deeply embedded cultural, ethical, and societal dimensions. A purely economic or technical approach is therefore insufficient to capture its full scope. In this context, it becomes necessary to broaden the traditional understanding of the business case by including non-economic evaluation criteria and reinterpreting it as part of a strategically holistic model.

This perspective aligns with the objectives of Activity 3 (see Subsection 5.4.3) and supports the integrative logic of the implementation guideline (Chapter 5.4).

5.5.1 From a Traditional to a Holistic Business Case

Traditional business cases in industrial settings are typically built on quantifiable metrics such as return on investment (ROI), cost-benefit calculations, or market share. These remain relevant in the halal context—particularly for assessing export potential, certification cost-efficiency, and scalability.

At the same time, the in-depth interviews (Subsections 4.1.3, 4.1.5, 4.1.7) and the internet questionnaire (Subsections 4.2.3, 4.2.6) indicate a growing awareness of qualitative or soft factors. Increasingly, halal is seen not only as a religious commitment but also as an indicator of ethical quality, corporate integrity, and consumer trust. In some non-Muslim-majority countries, halal is even perceived as a symbol of product excellence and transparency (cf. Azam and Abdullah, 2020).

The resulting holistic business case can be structured along four key dimensions:

1. Economic viability: Unlocking access to new target markets, export potential in Muslim-majority countries, and enhanced market penetration through product differentiation;
2. Cultural resonance: Addressing religious sensitivities, meeting societal expectations, and fostering a sense of cultural proximity with target consumer groups;
3. Ethical legitimacy: Avoidance of controversial ingredients, transparent supply chains, and credible adherence to spiritual norms; and
4. Strategic brand positioning: Building consumer trust, achieving differentiation in sensitive markets, and enhancing the ethical profile of the brand.

This framework broadens the classical economic lens by integrating normative and social considerations, which are becoming increasingly relevant given the expansion of global halal markets and evolving consumer expectations.

5.5.2 Trust and Cultural Competence as Prerequisites for Market Access and Legitimacy

Within the halal context, trust is not just a transactional quality, but a relational asset anchored in the perceived alignment between internal organisational behaviour and external religious-cultural expectations. The qualitative data (Subsections 4.1.5, 4.1.7) indicate that both consumer and regulatory acceptance depend not only on formal certification, but on demonstrable, consistent engagement with religious values.

Certification is therefore a necessary but insufficient condition for long-term legitimacy. Halal markets reward not just compliance, but credibility—expressed through transparent communication, visible commitment, and sustained development of intercultural competence. The internet questionnaire confirmed this: a majority of respondents highlighted that religious and cultural literacy is essential for successful market entry and durable stakeholder relationships.

This perspective is further supported by international research. Studies by Fajriyati *et al.* (2020) and Mukherjee (2014) argue that social recognition from religious target groups is an integral component of economic legitimacy. Countries with coherent halal governance, such as Malaysia or Indonesia, benefit in two key ways: through societal endorsement and measurable export success.

Accordingly, companies should align their halal strategies with both regulatory requirements and cultural points of resonance. This alignment applies not only to external messaging, but also to internal processes such as staff training, cross-functional coordination, and policy development (cf. Subsections 5.4.4 and 5.4.6).

Halal certification should thus be approached as a strategic and interdisciplinary undertaking that integrates economic logic, ethical commitments, and cultural intelligence. Only by combining robust business planning, cultural sensitivity, and audit-ready operational structures can a holistic business case be developed—one capable of positioning halal as a long-term competitive advantage.

5.6 Study Limitation and Future Research

Despite the systematic design, this study recognises several limitations. These concern methodological scope, thematic boundaries, and contextual focus, each of which affects the generalisation, depth, and transferability of the results. At the same time, these constraints offer concrete entry points for future research.

5.6.1 Limited International Generalisability

The empirical data primarily reflect the German chemical-pharmaceutical sector. While Chapter 2 provided a comparative overview of international certification frameworks, both the qualitative and quantitative results are strongly shaped by Germany's voluntary governance model and culturally pluralistic environment.

In contrast to countries like Malaysia or Indonesia, where halal certification is state-mandated and deeply institutionalised, Germany operates through market-driven, decentralised mechanisms. The direct applicability of these findings to other national contexts is therefore limited.

Future research should systematically explore halal governance in hybrid systems, ideally contrasting Muslim-majority with non-Muslim countries, to better understand variations in institutional legitimacy, stakeholder expectations, and regulatory design.

5.6.2 Sector-Specific Focus

The focus on the chemical-pharmaceutical industry enabled an in-depth analysis of unique sectoral challenges, yet it narrows the study's transferability to other industries. Sectors such as food, beverages, or cosmetics follow different certification dynamics, consumer sensitivities, and compliance pathways.

Moreover, this study adopted a company-centric view, without directly addressing the perspective of Muslim consumers. Their cultural expectations, trust factors, and perceptions of credibility remain underexplored, which limits the assessment of legitimacy and market acceptance.

Future research should pursue a cross-sectoral, consumer-inclusive approach that treats halal not only as a regulatory procedure but as a socio-religious ecosystem shaped by interactional trust and cultural competence.

5.6.3 One-Sided Perspective: Focus on Companies

Another limitation concerns the exclusive focus on companies and industry experts. Muslim consumers—arguably the central stakeholder group—were not included in the primary data collection. This omission was a deliberate methodological choice aimed at ensuring practical relevance and feasibility, yet it introduces a notable blind spot.

Given that halal perception is shaped by personal religiosity and cultural identification, a well-rounded understanding of acceptance, authenticity, and effectiveness must include end-user trust dynamics.

Future studies should explore consumer perceptions of halal transparency, brand integrity, and certification credibility—in both Muslim-majority and minority contexts.

5.6.4 Limited Process Data

Although the halal checklist developed in Section 2.5 offers a detailed tool for operational implementation, its use has not yet been empirically tested in industrial environments. No case-based field study was conducted to observe its integration into real-world production and audit routines.

This limits the ability to evaluate the practical utility, user-friendliness, and QMS compatibility of the checklist. Operational performance, implementation obstacles, and measurable process improvements remain theoretical assumptions.

Future research should conduct pilot studies, implementation trials, and field audits to validate the checklist under industrial conditions and to support iterative refinement of the tool.

5.6.5 Future Research Directions

The above limitations offer specific implications for further research:

- Cross-national comparative studies on halal governance, market dynamics, and certification models in Muslim and non-Muslim contexts;
- Sector-specific deep dives beyond pharmaceuticals and chemicals (e.g. food additives, or biotech);
- Inclusion of consumer and community perspectives, particularly to assess perceived legitimacy, emotional resonance, and ethical credibility;
- Process-accompanying research, including longitudinal studies to evaluate organisational transformation, QMS integration, and audit outcomes; and

- Technological innovations, such as digital audit platforms, traceability systems, and AI-based halal compliance monitoring.

This study provides a robust contribution to the understanding of halal certification in industrial contexts, with a particular focus on Germany. At the same time, the findings illustrate that halal must be conceptualised as a complex interplay of religious normativity, market logic, and sociocultural embeddedness.

The framework developed here—especially the checklist and implementation guideline—may serve as a scalable approach for further academic validation and practical adaptation.

5.7 Chapter Summary

Chapter 5 provided an integrated discussion of the empirical findings in relation to the three research questions, combining qualitative, quantitative, and theoretical perspectives. The analysis demonstrates that halal certification in the chemical and pharmaceutical sector must be understood as a strategic, interdisciplinary process that intersects with religious, regulatory and organisational dimensions.

The triangulated evaluation confirms:

- RQ1: Companies require clear and internationally coherent standards, as divergent interpretations of religious requirements lead to operational uncertainty. The halal checklist developed in this study offers a structured response by translating religious requirements into auditable, sector-compatible criteria;
- RQ2: While halal is recognised as a strategic opportunity, its implementation is impeded by structural limitations—including unclear responsibilities, limited resources, and insufficient management support. The checklist and business case together help frame halal not as a burden, but as a potential lever for market access, trust, and innovation; and
- RQ3: The implementation guideline developed in this study presents a modular, scalable framework that links religious expectations with internal governance structures. The five activities—ranging from contextual analysis to operational rollout—form a practical roadmap for industrial halal transformation.

The chapter also introduced an expanded business case approach, which integrates economic, ethical, cultural, and strategic factors. Trust and intercultural competence emerged as critical success factors—not only for certification, but for brand credibility, consumer loyalty, and stakeholder legitimacy.

Finally, the chapter concluded with a critical reflection on methodological limitations and proposed concrete, interdisciplinary research directions. Future research is encouraged to strengthen international comparability, incorporate consumer insights, and test the practical impact of tools like the halal checklist under real-world conditions.

6 SUMMARY AND CONCLUSION

6.1 Summary and Answers to the Research Questions

The objective of this dissertation was to investigate halal certification in the chemical-pharmaceutical sector as a multifaceted and context-sensitive phenomenon, shaped by religious, cultural, and regulatory dynamics, and to develop a practical, implementation-oriented guideline. The three central research questions (RQ1–RQ3) structured the analytical process and form the basis of this concluding summary.

6.1.1 RQ1 – Religious, Cultural, and Regulatory Requirements

The findings confirm that halal certification in the industrial context cannot be approached just as a technical standardisation exercise. Rather, it is deeply embedded in Islamic jurisprudence, cultural identity frameworks, and diverse national regulatory logics. The international comparison (Malaysia, Singapore, Indonesia, Turkey, UAE) illustrates significant differences in implementation, despite common religious roots.

A key contribution of this study is the development of a structured, sector-adapted halal checklist, derived from the most stringent international certification regimes. It is organised into five categories:

1. Raw materials and ingredients;
2. Logistics and warehousing;
3. Manufacturing and processing;
4. Audits and documentation; and
5. GMOs and enzymes.

This structure enables companies to translate abstract religious norms into actionable, auditable procedures—while ensuring alignment with existing QMS systems. It also facilitates comparability across jurisdictions and supports international scalability. While conceptually grounded, the checklist has not yet been empirically validated in live certification settings, which highlights a clear priority for future research.

Moreover, the results highlight that many halal requirements are motivated by cultural or normative principles rather than technical criteria. For example, Indonesia's mandate for Muslim supervisory staff or the rejection of certain enzyme sources reflect value-based expectations. This underscores the need for intercultural literacy within companies, particularly among compliance and quality teams.

6.1.2 RQ2 – Challenges and Opportunities for the German Industry

The study shows that German companies in the chemical-pharmaceutical sector benefit from robust quality infrastructures (e.g. ISO, GMP, HACCP), international supply chains, and a high level of regulatory compliance. However, substantial barriers remain in translating these strengths into halal-capable operations:

- Lack of harmonised international halal standards;
- Vagueness in interpreting religious rulings;
- Limited internal awareness of religious and cultural issues; and
- High bureaucratic and documentation burdens.

The integrated findings from interviews and questionnaire responses indicate a discrepancy between strategic interest and operational possibilities. While over two-thirds of respondents recognise halal as a promising market opportunity, many do not feel institutionally equipped to manage the complexity of its implementation.

Nonetheless, the research also identifies pragmatic entry points for improvement. The appointment of a halal compliance officer, the integration of halal into corporate reporting, and the development of targeted training formats. These measures address not only resource-related gaps but also cognitive and normative barriers, thereby strengthening companies' resilience and their capacity to navigate religious compliance frameworks.

6.1.3 RQ3 – Development of an Implementation Guideline

In response to the identified challenges and opportunities, the dissertation presents a modular, empirically grounded implementation guideline tailored to the chemical-pharmaceutical sector. The approach is designed for adaptability, and balances internal process dynamics with external certification requirements.

The five core activities are:

1. Germany's framework conditions (assessment);
2. Transparency of halal rules (establishment, incl. halal checklist);
3. Market evaluation and business case;
4. Integration of halal into the corporate strategy; and
5. Implementation of halal certification.

Each activity was elaborated in Section 5.4, with a clear division of internal and external responsibilities. The halal checklist serves as the technical backbone of the model, linking religious expectations to industrial practice and audit protocols.

The guideline adheres to key academic design principles: logical structure, contextual awareness, empirical triangulation, and operational feasibility. It offers companies a ready-to-use instrument to plan, implement, and monitor halal certification effectively.

Most importantly, the approach reframes halal certification as a strategic lever—not as a regulatory constraint, but as an enabler of market access, ethical brand development, and organisational resilience. In doing so, it positions halal as a multidimensional value driver in globalised business environments.

6.2 Practical and Strategic Implications for Industry

The strategic and practical implications of this dissertation derive from the systematic exploration of halal certification as an interdisciplinary governance instrument. The empirical findings demonstrate that halal certification is far more than an administrative declaration of product origin or manufacturing process.

6.2.1 Halal as a Strategic Differentiation Factor

The findings show that halal is increasingly understood as a symbol of ethical credibility, product integrity, and cultural connectivity—not only among Muslim consumers, but also across ethically conscious non-Muslim market segments. In dynamic export regions such as Southeast Asia and the Middle East, halal certification is frequently a precondition for market access, as seen in countries like Malaysia and Indonesia.

Implication: Companies should not view halal as a regulatory hurdle, but as a strategic positioning tool, comparable to sustainability or CSR initiatives. A proactive halal strategy can facilitate access to ethically motivated premium markets and unlock differentiation opportunities in saturated or highly regulated sector.

6.2.2 Integration into Existing Quality Management Systems

The halal checklist developed in this study was designed to be compatible with established QMS standards (e.g. ISO 9001, ISO 22000, GMP, HACCP), enabling seamless integration into existing audit, documentation, and training systems.

Implication: Halal should be implemented not as a standalone system, but as a functional extension of existing quality frameworks. This reduces redundancy, enhances internal acceptability, and supports external audit compatibility. The checklist enables structured self-assessment and provides a verifiable pathway toward certification.

6.2.3 Governance and Accountability as Success Factors

The qualitative findings underscore that unclear responsibilities and fragmented communication significantly hinder halal implementation. In many companies, halal is either insufficiently institutionalised or delegated ad hoc to technical departments.

Implication: Halal considerations should be embedded early in corporate governance structures—e.g. through the appointment of a halal officer, the inclusion of halal in cross-functional committees, or the alignment of halal activities with existing compliance or risk functions. These measures enhance both implementation feasibility and institutional legitimacy.

6.2.4 Halal Checklist as a Bridging Instrument

As outlined in Sections 5.2 and 6.1, the halal checklist serves as a translation tool between religious requirements and industrial application. It condenses fragmented international halal provisions into standardised, auditable criteria.

Implication: The checklist can serve as a governance instrument throughout all stages of halal implementation, ranging from supplier evaluation and procurement to production planning and audit preparation. For companies without prior halal experience, it offers critical operational guidance and supports intercultural alignment.

6.2.5 Role of Management and Leadership Accountability

Responsibility for halal certification should not be restricted to operational units. The findings clearly show that top management support is a key success factor, especially with respect to strategic integration, budgeting, and long-term commitment.

Implication: Executives should approach halal as part of a company-wide transformation process. Three guiding principles emerge:

Three overarching principles can be derived:

- Strategic orientation: Halal should be understood not as a short-term compliance measure, but as an integral component of long-term market positioning;
- Systematic integration: Halal requirements must be embedded within existing corporate structures, supported by clearly defined responsibilities and measurable performance indicators; and
- Culturally informed communication: Credibility and trust are fostered through culturally sensitive engagement and transparent, value-driven brand communication.

In summary, this study shows that halal certification in the chemical-pharmaceutical industry is not a niche activity—but a multidimensional governance tool, linking religious compliance, product quality, cultural legitimacy, and strategic differentiation. Its successful implementation requires not only technical precision, but also ethical awareness and intercultural competence.

6.3 Theoretical Contribution and Practical Relevance

This dissertation makes a significant contribution to academic discourse and industrial practice by examining halal certification within a previously underexplored sector. Its core contribution is the operationalisation of religious norms and their integration into existing corporate systems. The findings demonstrate relevance on three interrelated levels: theoretical conceptualisation, practical implementation, and regulatory alignment.

6.3.1 Theoretical Significance

From a theoretical perspective, this study contributes to the interdisciplinary development of halal research by combining legal-normative frameworks (Chapter 2), qualitative insights (Section 4.1), and quantitative validation (Section 4.2). This integrated approach enables a differentiated systematisation of halal certification as a governance mechanism situated between religion, law, and industry.

Halal is thus not treated solely as a religious principle, but as a hybrid instrument of regulation—mediating between religious principle, state oversight, and corporate compliance. The study demonstrates how Islamic norm categories (sharia), national halal authorities (e.g. BPJPH, JAKIM, MUIS), and company standards (e.g. GMP, ISO, QMS) interact in ways that are context-dependent and frequently contested.

The halal checklist developed in Section 2.5 offers a theoretically grounded and empirically informed tool that operationalises abstract norm systems into auditable categories. It may serve as a structured reference for future research in areas such as implementation analysis, cross-sectoral comparisons, or standard development.

A further theoretical contribution lies in situating halal certification within the broader discourse on norm governance, showing that religious standards emerge through negotiation processes involving political, economic, and spiritual actors. In this regard, the study extends critical norm research and contributes to the political economy of religion and ethics-based regulation.

6.3.2 Practical Significance

In practical terms, the study presents a sector-specific and implementation-oriented framework for halal certification in the chemical-pharmaceutical industry. The findings reveal that while companies generally show interest in engaging with halal requirements, there is often a lack of structured guidance and internal capabilities.

The proposed guideline (Section 5.4) addresses this by providing an approach that is compatible with established quality systems. It serves not only as a compliance tool, but also as a communication interface for dialogue with certifiers, suppliers, and public authorities.

The halal checklist can be applied across multiple operational domains, such as raw material sourcing, supplier evaluation, risk management, and internal training. It also supports preparation for both internal audits and external certifications.

Additionally, the study highlights the importance of internal governance mechanisms: designated halal officers, cross-functional steering groups, and defined responsibilities are essential for credible and sustainable implementation. The idea of an external coordination platform, potentially hosted by an industry association or halal competence centre, is presented as a logical extension (cf. Subsection 5.4.6).

6.3.3 Critical Reflection and Limitations

Despite its methodological and conceptual rigour, this study acknowledges several limitations that should be considered in interpreting its results:

- Corporate-centred perspective: The empirical design primarily centres on manufacturers and subject-matter experts. The exclusion of consumer perspectives, especially those from Muslim communities, limits the study's ability to capture how halal certification is perceived, legitimised and accepted in everyday market contexts;
- National scope: The analysis is embedded in the German regulatory and cultural context. This focus restricts direct comparability with jurisdictions where halal is state-administered or religiously embedded in public law, such as Indonesia; and
- Lack of longitudinal data: The implementation guideline and checklist were developed conceptually and validated through expert input, but not tested in practice over time. As a result, statements on operational stability, learning effects, or long-term economic returns of halal certification remain hypothetical and warrant further empirical scrutiny.

Nevertheless, the triangulated methodology and applied framework enable meaningful transferability to adjacent sectors (e.g. nutraceuticals, medical devices) and create a basis for practice-accompanying future research.

6.3.4 Possible Effects on the Application Area

The findings of this dissertation suggest tangible effects for key stakeholders in the halal certification environment—particularly for companies in the chemical-pharmaceutical industry, policymakers, and halal certification bodies.

- Industry actors: The study contributes to reframing halal as a strategic resource rather than a compliance burden. This shift in perception can support proactive engagement, drive innovation, and position companies competitively in ethically oriented markets;
- Industry coordination: The observed lack of consistent standards and shared interpretation suggests a need for collaborative platforms. Sector-specific associations or halal competence centres could play a mediating role between regulatory authorities, market actors, and certification bodies;
- Intercultural alignment: The study highlights that communication around halal must go beyond technical accuracy to reflect cultural authenticity. Credible symbolic actions such as involving Muslim advisors or implementing targeted consumer education initiatives can help build trust and reduce the risk of misinterpretation; and
- Regulatory harmonisation: The checklist may support the unification of fragmented international certification practices. In the long term, its integration into quality frameworks or EU-level discussions could contribute to better mutual recognition and facilitate export dynamics.

6.3.5 Contribution to Knowledge

In summary, this dissertation contributes new knowledge on three key levels:

- Theory: It conceptualises halal certification as a multi-level governance instrument, interlinking religious, political, and economic spheres. This opens up new paths for interdisciplinary research on how faith-based norms are embedded into institutional systems and translated into industrial regulation;
- Practice: It provides a ready-to-use implementation approach, enabling companies to navigate the complexity of halal with structured guidance and operational clarity. By aligning religious expectations with corporate quality systems, the guideline facilitates efficient implementation without duplicating existing structures; and

- Policy: It outlines the need for regulatory harmonisation and coordination, offering impulses for institutional development and international dialogue. The halal checklist developed in this study can serve as a reference tool for policy actors aiming to standardise certification procedures and improve global certificate recognition.

Together, these contributions advance the conceptualisation, operationalisation, and governance understanding of halal certification—laying the foundation for more coherent practice, evidence-based policy, and academically grounded innovation across sectors.

6.4 Conclusion

The aim of this dissertation was to conduct a holistic and implementation-oriented analysis of halal certification, examining the intersection of religious norms, industrial processes, and international regulatory frameworks within the context of the German chemical-pharmaceutical sector. The research pursued a dual objective: first, to develop a systematic understanding of relevant requirements; and second, to provide a practical, scalable guideline for corporate implementation. A central concern was to explore how halal requirements can be strategically embedded and operationalised within complex industrial environments.

A triangulated mixed-methods approach was employed, combining qualitative in-depth interviews, a quantitative internet questionnaire, and an extensive literature review to investigate the three research questions (RQ1–RQ3). The following parts summarise how these questions were addressed and how the findings informed the conceptual framework and operational tools developed in this study.

RQ1: What are the religious, cultural, and regulatory requirements for halal certification of chemical and pharmaceutical goods?

This question was addressed through a comparative analysis of five leading national halal certification administrations (Malaysia, Singapore, Indonesia, Turkey, and the UAE), supported by empirical data. The analysis identified significant inconsistencies in religious interpretations and national audit procedures—particularly regarding ethanol usage, the treatment of genetically modified organisms (GMOs), and ritual purification standards.

To mitigate such uncertainties, this dissertation introduced a structured halal checklist that integrates the most stringent international requirements into a clear, auditable, and industry-compatible tool. This checklist not only operationalises abstract religious principles but also enhances regulatory alignment and procedural clarity—particularly within multi-standard or export-driven environments (see Section 2.5 and Subsection 6.1.1).

RQ2: What are the key challenges and opportunities for the German chemical-pharmaceutical sector in aligning with the requirements of the halal market?

This research question was addressed through an integrated analysis of qualitative and quantitative data, which revealed a pronounced disconnect between strategic intent and operational capacity. Key barriers include limited intercultural competence, ambiguous allocation of responsibilities, and the widespread perception of halal certification as an administratively burdensome requirement.

Simultaneously, the findings highlight considerable strategic potential—particularly in relation to market access in Muslim-majority countries, ethical product differentiation, and enhanced consumer trust that extends beyond religious affiliations. The study identifies practical measures, such as appointing halal officers, embedding certification in governance structures, and targeted staff training, as effective levers to close the strategy–execution gap.

Accordingly, halal is reconceptualised as a cross-functional and cross-cultural strategic opportunity. Rather than being reduced to a compliance exercise, it is positioned as a catalyst for ethical branding, institutional legitimacy, and global market competitiveness (see Sections 4.3 and 6.1.2).

RQ3: What systematic guidelines can be developed to help the German chemical-pharmaceutical manufacturing sector successfully tap into the potential of the halal market?

In response to this question, a five-step implementation guideline was developed, offering a flexible and empirically grounded framework for halal integration. The guideline delineates a structured implementation pathway—from contextual analysis to audit preparation—and is designed to assist companies in navigating both external religious expectations and internal organisational processes.

It integrates:

- Contextual analysis (Germany's framework conditions);
- Regulatory clarification (transparency of halal rules);
- Market evaluation (business case and cost-benefit logic);
- Strategic integration (of halal into corporate strategy); and
- Operational execution (implementation).

The guideline is designed to be modular and scalable, ensuring adaptability and sectoral context. It complements the checklist by providing actionable guidance and fostering alignment across religious, managerial, and operational domains (see 5.4 and 6.1.3).

Summary

In summary, halal certification must be understood as a multidimensional governance challenge—positioned at the nexus of religion, regulation, and industrial practice. It involves not only normative compliance, but also strategic positioning, cultural competence, and institutional learning.

This dissertation offers a conceptually grounded and practically relevant response to this complexity. Through the integration of legal-theological foundations, empirical data, and managerial design logic, it delivers a systematic model for halal implementation in one of the most regulation-intensive industrial sectors.

The tools developed—particularly the halal checklist and the modular implementation guideline—equip companies to move beyond formal compliance towards culturally resonant, operationally robust, and strategically embedded halal practices. These instruments offer a concrete foundation for building internal capabilities, establishing external credibility, and contributing to the consolidation of halal governance.

By bridging normative expectations and business realities, this dissertation contributes to a broader rethinking of halal—not as a niche requirement, but as a future-oriented, ethical, and cross-culturally significant component of global industrial governance.

6.5 Recommendations and Outlook

This dissertation has demonstrated that halal certification within the chemical-pharmaceutical sector constitutes a complex and strategically significant field of action, shaped by religious, regulatory, and industrial factors. To support further development in this area, targeted initiatives are recommended at three levels: academic research, industrial practice, and regulatory policy.

6.5.1 For Scientific Research

Recommendation 1: Country-specific case studies on halal governance in Muslim-majority countries

In countries such as Malaysia or Indonesia, halal serves not only as a religious standard but also as a deliberate instrument of industrial and cultural policy. Future research should explore how halal certification is employed to guide economic development, support export strategies, and promote cultural identity—and how these dynamics affect international trade relations, norm alignment, and consumer perception.

Recommendation 2: Comparative studies across societal contexts

Given the structural differences between Muslim-majority states and countries like Germany, comparative research on the governance, social legitimacy, and practical implementation of halal standards across diverse contexts can offer critical insight. Such studies could shed light on the potential for cultural adaptability, policy transfer, and standardisation.

Recommendation 3: Longitudinal research on implementation impacts

Extended case studies that trace halal implementation processes over time are needed to examine their organisational impact, sustainability, and institutional integration. This includes the evolution of governance structures, employee engagement, and operational outcomes—contributing to a more dynamic understanding of halal as a process rather than a static certification.

Recommendation 4: Integration of consumer-centred perspectives

Current research is largely focused on producers and certifiers. Future work should systematically integrate the views of Muslim and non-Muslim consumers to understand how trust, religious meaning, and symbolic interpretation influence purchasing behaviour. This would help frame halal certification not only as a compliance mechanism but as a culturally embedded trust good within the broader socio-economic landscape.

6.5.2 For the Chemical-Pharmaceutical Sector

Recommendation 1: Pilot implementation of the developed guideline

Companies are encouraged to apply the five-step implementation approach (see Section 5.4) in selected pilot projects. These projects should be documented and evaluated with the aim of generating transferable insights into best practices, barriers, and success factors—especially across different product categories and operational environments.

Recommendation 2: Development of a sector-specific halal coordination platform

A centralised service unit, possibly embedded within an industry association, could support standardisation and help reduce operation costs. This platform could coordinate with certification bodies, offer tailored training formats, monitor regulatory developments, and facilitate international engagement. Such an infrastructure would professionalise halal management across the sector.

Recommendation 3: Institutionalisation of halal competence within companies

Organisations should invest in dedicated halal expertise, such as by appointing halal officers, integrating halal criteria into supplier evaluation processes, and linking compliance efforts with internal audit or quality control units. Doing so strengthens organisational reliability and reinforces credibility among external stakeholders.

6.5.3 For Policymakers and Halal Standardisation Bodies

Recommendation 1: Active participation in international halal standardisation

The EU and national governments should intensify their engagement in platforms such as the OIC and SMIIC to ensure that European industries are represented in the formulation of global halal standards. A more active role could support mutual certificate recognition and reduce trade barriers in high-growth halal markets.

Recommendation 2: Establishment of halal competence centres

Policymakers, particularly those in economic development and trade ministries, should work in partnership with civil society and the private sector to establish interdisciplinary halal support units. These could provide regulatory advice, cultural mediation, and companies specific assistance. By addressing both technical and social dimensions, such centres would enhance accessibility and reduce entry barriers.

Recommendation 3: Alignment of halal with ESG and sustainability agendas

Halal certification touches on several themes central to Environmental, Social, and Governance (ESG) frameworks, including ethical production, supply chain transparency, and inclusion. Policymakers and corporate strategists alike should integrate halal into broader sustainability and diversity strategies—positioning it not as a marginal religious issue, but as a legitimate dimension of responsible business conduct.

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7 APPENDIX

7.1 Population Development

The most significant population increase between 2000 and 2050 is projected for Africa. As illustrated in the table below, the continent's population is expected to grow by 208%, which equates to an increase of approximately 1.7 billion people—from 1.355 billion in 2000 to 2.520 billion in 2050.

Growth is especially pronounced in East Africa, where a rise of 232% is anticipated, corresponding to an increase of 0.6 billion people, with key contributions from Ethiopia, Tanzania, Uganda, and Zambia. Similarly, Central Africa is expected to experience extraordinary growth of 300% (0.3 billion), largely driven by Angola, the Democratic Republic of Congo, and the Republic of Congo. West Africa is also forecasted to expand substantially, with a projected growth of 240%, equivalent to 0.57 billion people (including Nigeria, Niger, Mali, and Côte d'Ivoire) (United Nations, 2020, 2022).

Table 1: Population and growth 1950 – 2050, Africa (Rutkowski, 2024)

Population (m)	1950	2000	2010	2020	2030	2040	2050	Growth 2000-2050	Population 2000-2050
Eastern Africa	67	260	342	450	576	716	862	232%	603
Middle Africa	27	97	133	181	240	310	387	299%	290
Northern Africa	49	173	205	249	292	334	376	117%	203
Southern Africa	16	52	59	68	77	83	89	70%	37
Western Africa	72	237	310	406	522	657	806	240%	569
Africa	**230**	**819**	**1,049**	**1,355**	**1,707**	**2,100**	**2,520**	**208%**	**1,702**

Asia, the most populous region, had approximately 3.8 billion people in 2000 and is projected to reach 5.36 billion by 2050. This represents an increase of 41%, or 1.57 billion people. The highest growth is expected in South Asia (+65%, 960 million) and West Asia (+108%, 234 million).

Table 2: Population and growth 1950 – 2050, Asia (Rutkowski, 2024)

Population (m)	1950	2000	2010	2020	2030	2040	2050	Growth 2000-2050	Population 2000-2050
Central Asia	18	56	64	75	85	94	102	81%	46
Eastern Asia	686	1,541	1,634	1,700	1,726	1,695	1,636	6%	95
South-Eastern Asia	167	532	605	678	737	780	805	51%	273
Southern Asia	499	1,473	1,733	1,967	2,175	2,331	2,430	65%	957
Western Asia	52	187	235	284	325	359	388	108%	201
Asia	**1,421**	**3,789**	**4,272**	**4,704**	**5,049**	**5,258**	**5,360**	**41%**	**1,571**

Europe is the only region expected to experience a population decline, with a reduction of approximately 2% (from 737 million to 719 million) between 2000 and 2050, despite ongoing immigration trends. Eastern Europe is projected to contract by 14% (−48 million), particularly in Ukraine, Romania, and Belarus, while Western Europe is expected to grow modestly (+8%, 14

million), notably in France, Belgium, and Austria. Germany, in particular, will see a decrease of 2% (from approx. 83 to 81 million).

Table 3: Population and growth 1950 – 2050, Europe (Rutkowski, 2024)

Population (m)	1950	2000	2010	2020	2030	2040	2050	Growth 2000-2050	Population 2000-2050
Eastern Europe	223	309	299	298	289	275	265	-14%	-43
Northern Europe	79	96	102	108	111	114	116	21%	21
Southern Europe	110	147	155	154	150	145	138	-6%	-9
Western Europe	145	185	191	199	201	201	199	8%	14
Europe	**557**	**737**	**747**	**758**	**751**	**736**	**719**	**-2%**	**-18**

Latin America, the Caribbean, and North America are expected to grow by 40% (357 million) between 2000 and 2050, increasing from 846 million to 1.203 billion. The United States, the most populous country in this region, is projected to grow by 34% (98 million).

Table 4: Population and growth 1950 – 2050, Latin America, Caribbean, Northern America

Population (m)	1950	2000	2010	2020	2030	2040	2050	Growth 2000-2050	Population 2000-2050
Caribbean	17	39	42	44	46	48	48	24%	9
Central America	38	137	160	182	201	216	227	66%	90
South America	115	353	398	437	469	489	498	41%	145
Canada	14	31	35	38	41	44	46	49%	15
United States of America	161	286	313	335	354	371	384	34%	98
Latin America, Caribbean, Northern America	**346**	**846**	**947**	**1,037**	**1,112**	**1,168**	**1,203**	**42%**	**357**

Development of the regions: The expansion of the halal market can be partially inferred from population growth in developing regions. Developed regions (Europe, North America, Japan), which represented around 20% of the global population in 2000, are projected to grow by 7% (89 million) by 2050. In contrast, less developed countries—comprising Africa, most of Asia, Latin America, and the Caribbean—are expected to grow by 53% (2.31 billion). The least developed countries, including 47 nations (32 of which are in sub-Saharan Africa), are projected to represent 14% of the global population by 2020, despite accounting for less than 2% of global GDP and about 1% of global trade. This group is expected to grow by 187% (1.237 billion) by 2050 (United Nations, 2020, 2022).

Income consideration: Income levels were also considered in this analysis. Higher income typically correlates with an improved standard of living and increased life satisfaction. Populations in higher-income brackets tend to have better access to education, healthcare, and housing.

Table 5: Population and growth 1950 – 2050, development regions (Rutkowski, 2024)

Development Group (m)	1950	2000	2010	2020	2030	2040	2050	Growth 2000-2050	Population 2000-2050
More developed regions	826	1,207	1,252	1,290	1,303	1,302	1,296	7%	89
Less developed regions, excl. least developed countries	1,544	4,352	4,956	5,538	6,036	6,403	6,665	53%	2,312
Least developed countries	197	663	845	1,069	1,329	1,610	1,901	187%	1,237
Total	**2,567**	**6,222**	**7,053**	**7,897**	**8,668**	**9,316**	**9,861**	**71%**	**4,876**

Countries are categorised by income based on per capita gross national income, accounting for economic growth, inflation, exchange rates, and demographic trends. High-income (USD >12,535), upper-middle (USD 4,046–12,523), lower-middle (USD 1,036–4,045), and low-income (below USD 1,036) classifications follow the Atlas method (Serajuddin and Hamadeh, 2020; World Bank, 2022).

High-income countries accounted for 18% of the world's population in 2000 and are expected to grow by 19% (211 million) by 2050. Middle-income countries (74% of global population) are expected to grow by 52% (4.3 billion), and the lowest-income countries (7% in 2000) are forecasted to grow by 221% (1.03 billion), reaching 15% of the global total (United Nations, 2020, 2022).

Table 6: Population and growth 1950 – 2050, income groups (Rutkowski, 2024)

Income Group (m)	1950	2000	2010	2020	2030	2040	2050	Growth 2000-2050	Population 2000-2050
High-income countries	705	1,129	1,214	1,280	1,316	1,335	1,340	19%	211
Upper-middle-income countries	950	2,316	2,507	2,691	2,806	2,841	2,835	22%	2,398
Lower-middle-income countries	773	2,309	2,720	3,139	3,537	3,893	4,189	81%	1,880
Low-income countries	138	465	609	783	1,005	1,243	1,493	221%	1,028
Total	**2,567**	**6,220**	**7,050**	**7,894**	**8,664**	**9,312**	**9,857**	**58%**	**3,637**

Fertility and life expectancy trends show declining birth rates and rising longevity across all regions. In Africa, fertility declined from 6.6 (1950) to 5.2 (2020), and is projected to reach 3.0 by 2050, with life expectancy increasing from 53 to 70 years. Similar patterns appear in Asia and Latin America (United Nations, 2020, 2022).

Table 7: Fertility, life expectancy 1950 – 2050, worldwide (Rutkowski, 2024)

Values	Region, subregion, country or area *	1950	1960	1970	1980	1990	2000	2010	2020	2030	2040	2050
Total fertility (live births per woman)	Africa	6.6	6.7	6.7	6.6	6.0	5.2	4.8	4.3	3.8	3.3	3.0
	Asia	6.0	5.7	5.5	3.8	3.2	2.5	2.3	2.1	2.0	1.9	1.9
	Europe	2.6	2.6	2.3	1.9	1.7	1.4	1.6	1.6	1.7	1.7	1.7
	Latin America and the Caribbean	5.8	5.9	5.2	4.2	3.3	2.6	2.2	2.0	1.9	1.8	1.7
	Northern America	3.1	3.5	2.3	1.7	2.0	2.0	1.9	1.7	1.8	1.8	1.8
	Oceania	3.7	4.1	3.4	2.7	2.5	2.5	2.5	2.3	2.2	2.1	2.1
Life expectancy at birth (years)	Africa	36	41	46	50	52	53	59	63	66	68	70
	Asia	41	45	55	60	64	67	71	74	75	77	78
	Europe	62	68	70	71	73	73	76	79	80	82	83
	Latin America and the Caribbean	50	56	60	64	68	72	74	76	77	79	81
	Northern America	68	70	71	74	75	77	79	79	81	82	84
	Oceania	58	63	65	69	72	74	77	79	80	81	82

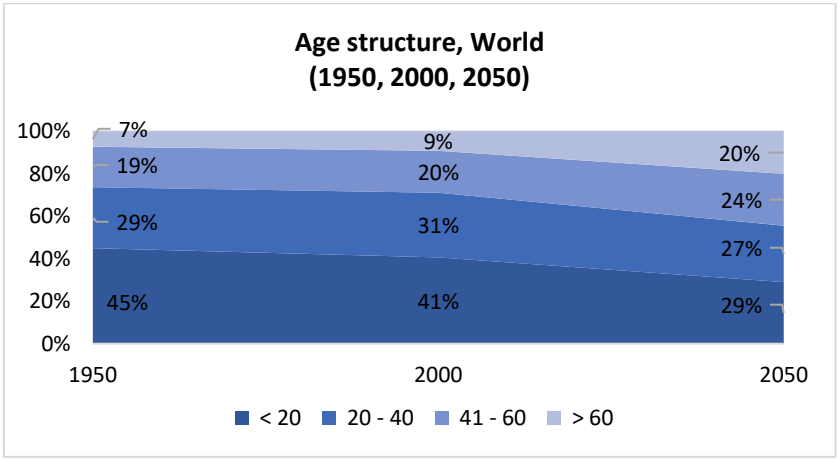
Income-based trends mirror these developments. High-income countries exhibit stable fertility (1.6–1.7) and high life expectancy (85 years). Low-income countries are expected to see fertility

drop from 5.8 (2000) to 2.9 (2050), and life expectancy rise from 53 to 71 year (United Nations, 2020, 2022).

Table 8: Fertility, life expectancy 1950 – 2050, income, development countries (Rutkowski, 2024)

Values	Region, subregion, country or area *	1950	1960	1970	1980	1990	2000	2010	2020	2030	2040	2050
Total fertility (live births per woman)	High-income countries	3.0	3.0	2.5	2.0	1.8	1.7	1.8	1.7	1.7	1.7	1.7
	Upper-middle-income countries	5.9	5.4	5.1	3.1	2.6	1.9	1.8	1.9	1.8	1.8	1.8
	Lower-middle-income countries	5.8	5.9	5.7	5.1	4.2	3.5	3.0	2.6	2.5	2.3	2.2
	Low-income countries	6.3	6.6	6.7	6.6	6.3	5.8	5.1	4.3	3.7	3.2	2.9
Life expectancy at birth (years)	High-income countries	64	68	70	73	75	78	80	81	83	84	85
	Upper-middle-income countries	45	48	60	65	68	70	73	76	78	79	81
	Lower-middle-income countries	38	45	50	55	59	62	66	69	71	72	74
	Low-income countries	34	39	43	48	50	53	59	64	67	69	71
Total fertility (live births per woman)	More developed regions	2.8	2.7	2.3	1.9	1.7	1.6	1.7	1.6	1.7	1.7	1.7
	Less dev. regions, excl. least dev. countries	6.2	5.9	5.7	4.0	3.3	2.6	2.4	2.3	2.2	2.1	2.0
	Least developed countries	6.5	6.7	6.8	6.6	6.0	5.2	4.5	3.9	3.4	3.1	2.8
Life expectancy at birth (years)	More developed regions	63	69	71	72	74	75	78	80	81	82	84
	Less dev. regions, excl. least dev. countries	41	46	55	60	64	66	70	72	74	76	77
	Least developed countries	35	40	44	47	51	55	61	65	68	70	72

Ageing populations: Due to increased life expectancy, populations are ageing globally. The proportion of individuals under 20 is expected to fall from 45% (1950) to 29% (2050), while the over-60 population will rise from 7% to 20% (United Nations, 2020, 2022).



World	1950	2000	2010	2020	2030	2040	2050
< 20	45%	41%	37%	34%	32%	30%	29%
20 - 40	29%	31%	30%	29%	28%	27%	27%
41 - 60	19%	20%	23%	24%	25%	25%	24%
> 60	7%	9%	10%	12%	15%	18%	20%
Total (m)	**2,567**	**6,222**	7,053	7,897	8,668	9,316	**9,861**

Figure 1: Age structure 1950 – 2050, worldwide (Rutkowski, 2024)

Notably, two significant trends emerge in Africa, Asia, and Europe. In Africa, approximately 53% of the population was under 20 in 2000; this proportion is expected to drop to 43% by 2050, while the share of people over 60 is projected to rise from 5% in 2000 to 8% by 2050, although this remains below the world average.

Table 9: Age structure 1950 – 2050, Africa (Rutkowski, 2024)

Africa	1950	2000	2010	2020	2030	2040	2050
< 20	53%	55%	53%	52%	49%	46%	43%
20 - 40	27%	27%	28%	28%	29%	30%	30%
41 - 60	15%	13%	14%	15%	16%	17%	19%
> 60	5%	5%	5%	5%	6%	7%	8%
Total (m)	**230**	**819**	1,049	1,355	1,707	2,100	**2,520**

A similar trend can be observed in Asia. There, 41% of the population was under 20 in 2000, and by 2050, this is expected to decline to 25%. The proportion of individuals over 60 will increase threefold, rising from 8% in 2000 to 23% by 2050.

Table 10: Age structure 1950 – 2050, Asia (Rutkowski, 2024)

Asia	1950	2000	2010	2020	2030	2040	2050
< 20	48%	41%	36%	32%	29%	27%	25%
20 - 40	29%	32%	32%	30%	28%	27%	26%
41 - 60	18%	19%	23%	25%	27%	27%	26%
> 60	6%	8%	9%	12%	16%	19%	23%
Total (m)	**1,421**	**3,789**	4,272	4,704	5,049	5,258	**5,360**

Europe represents the oldest demographic group. In 2000, 19% of individuals were over 60; this figure is projected to increase to one in three by 2050. The proportion of people under 20 is expected to fall from 22% in 2000 to 20%.

7.2 Current Halal Approaches

Extending the discussion to non-Muslim consumers, Ismail, Nasiruddin and Samad (2017) identify a growing preference for health-conscious and safe consumption choices when compared to non-halal alternatives. Zakaria, Musa and Gan (2019) further support this view, highlighting the increasing appeal of halal-certified ingredients in skincare and cosmetic products across various religious groups. However, these trends are accompanied by growing calls for more robust legislative frameworks to safeguard halal integrity across different sectors.

Malaysia, ranked as a leading nation in the Global Islamic Economy Index (GIEI), has taken steps to strengthen the institutionalisation of halal governance by integrating a halal executive into its certification procedures (Jais, 2019). This role is designed to ensure compliance with Shariah principles and to enhance the permissibility of products and services for Muslim consumers. As a result, Malaysia's halal certification system is underpinned by government legislation and serves as a regulatory model for other jurisdictions.

The presence of illicit activities within halal-related supply chains highlights the urgency of legal reinforcement. McElwee, Smith and Lever (2017) exemplify this by analysing the UK halal sheep industry, where certain actors pursue profit through practices deemed unproductive or even harmful to society. Similarly, Ropiah (2016) contends that marketing activities must be aligned with Shariah principles, especially concerning pricing and certification compliance, to avoid

misleading consumers. Najmaei *et al.* (2017) add that Islamic marketing itself remains an evolving field, requiring ongoing conceptual refinement..

However, as Adnan (2013) observes, Islamic epistemology currently offers only a limited basis for developing comprehensive marketing theories and frameworks. The core strategic elements of Islamic marketing remain under-theorised and lack alignment with broader paradigms of strategic management. In this context, Yusuf and Yajid (2016) draw attention to the scarcity of qualified personnel capable of translating Shariah-based theoretical knowledge into actionable business practice—a constraint that significantly affects the operational capacity of the halal sector.

Meanwhile, the United Arab Emirates (UAE) is positioning itself as a rival to Malaysia by promoting internationally recognised halal standards and leveraging Gulf-region trade hubs for the re-export of certified products (Fagan, 2015). However, weaknesses in data protection and cybersecurity present barriers to effective consumer segmentation and market analysis. Jreissat *et al*. (2017), in their work on customer-oriented models for new product development, argue that only a small proportion of companies are currently equipped to respond swiftly and effectively to diverse consumer demand.

An increasingly critical factor in this context is the General Data Protection Regulation (GDPR). Van de Waerdt (2020) notes that many consumers remain unaware of the extent to which their personal data is collected and used. Despite its regulatory ambitions, the GDPR does not yet guarantee full transparency in data-driven business models, a concern echoed by Jarota (2023).

Given these developments, it is essential to explore strategic responses that align with the principles of open innovation. This approach, as outlined by Schmuck and Benke (2020), encourages the broadening of traditional knowledge boundaries through both inbound and outbound flows of expertise. It allows companies to adapt more effectively to technological changes and evolving market environments while maintaining contextual sensitivity.

7.3 Data Collection Tools

7.3.1 Questions for In-Depth Interviews

Brief background:

- Describe your role and responsibility in the organisation?
- From your perspective, what is your interpretation of halal?

Table 7-1: In-depth interview questions

Qualitative Theme	No	QUAL Questions
4.1.1 Interpretation of Halal	0	How would you personally define or interpret the concept of halal?
4.1.2 Background & Significance	1	Why could it be important for Muslims living in Germany to consume Halal certified goods?
	2	What influence does religion, cultural background and values have on the choice of Halal certified goods the Muslim community consume in Germany?
	3	From the above, are there any additional factors that determine the choice of Halal certified goods the Muslim community consume in Germany?
4.1.3 Market Implications	4	What is the importance of Halal certification and how does one get it?
	5	What strategic impact could the Halal market development in Germany have on your long-term strategic plans?
	6	How would your organisation deal with the above factors? Which approach would you recommend?
4.1.4 Certification Standards	7	What is the value of certification standards (e.g., ISO, DIN)?
	8	How would you rate your organisation's effort in implementing Halal certification?
	9	What steps has your organisation taken to enhance existing Halal certification standards?
4.1.5 Holistic Understanding	10	How important is it to have a good understanding of Muslim culture, values, and market requirements for certification?
	11	How would you fit your strategic organisational structure into the entire certification value chain?
4.1.6 Certification Processes	12	Are different processes for Halal certification imaginable depending on target markets?
	13	Would you prefer one strict model or multiple models for different markets?
	14	What are the biggest challenges in implementing the Halal certification process?
	15	Are new business processes imaginable and practicable in your organisation?
	16	How would you rate the use of blockchain or other digital business processes for Halal certification?
4.1.7 Holistic Opportunities	17	What new opportunities would Halal certification open up for your organisation?
	18	What are the possible barriers to implementing the proposed process?
	19	From a strategic perspective, how do you assess the potential impact of the proposed process approach on your organisation and the Muslim community?

7.3.2 Questions for Internet Questionnaire

The first four questions of the questionnaire served to collect basic demographic and occupational data for statistical purposes. These included information on the sector of professional activity, current job title, department within the company, and the respondent's gender.

Table 7-2: Internet questionnaire questions

Thematic 1: Definition and significance of halal certification

5	What is your definition of the term halal?	Islam	
		Allowed goods for all Muslims in the sense of Islam	
		Regulations of individual Islamic countries	
		I don't know	
		Open answer	
6	How do you assess the future significance of the halal certification for the Muslim community?	Very high	
		High	
		Neutral	
		Low	
		Not important	
		I don't know	

Thematic 2: Halal certification factors

7	How important are "Islam belief and practices" for halal certification?	Very important	
		Important	
		Fairly important	
		Slightly important	
		Not important	

Thematic 3: Halal market and its impact

10	How do you assess the halal market development in generally?	The halal market is growing	
		The halal market remains the same	
		The halal market is in declining	
		I don´t know	
		No	
		I don´t know	
11	How important is it in the case of halal market growth that the German chemical-pharmaceutical industry pushes ahead with halal certification?	Very important	
		Important	
		Slightly important	
		Fairly important	
		Not important	

Thematic 4: Certification importance and effort

12	How important are certification standards to your organisation?	Very important	
		Important	
		Slightly important	
		Fairly important	
		Not important	
13	How would you rate your organisation effort in implementing certification standards?	Very high	
		High	
		Neutral	
		Low	
14	How would you rate your organisation effort in the implementation of halal certification?	Very high	
		High	
		Neutral	
		Low	

Thematic 5: Halal certification processes

15	Are different processes for halal certification imaginable and implementable depending on target market requirements?	Yes	
		No	
16	For reasons of complexity, would you prefer one approach with the strictest halal requirements or two and more approaches depending on target market requirements?	Yes	
		No	
17	Are new business processes imaginable and practicable in your organisation?	Yes	
		No	

Thematic 6: Holistic understanding

19	How important is an understanding of the Muslims backgrounds, values and the market requirements for a certification?	Very important	
		Important	
		Fairly important	
		Slightly important	
		Not important	
20	How important is it for your organisation to have a better understanding of the future market development for halal certified goods	Very important	
		Important	
		Slightly important	
		Fairly important	
		Not important	
21	How important is it for the senior managers to have a holistic understanding of the organisational structure and the entire value chain for certification standards?	Very important	

		Important	
		Slightly important	
		Fairly important	
		Not important	
22	How would you assess the importance of a holistic certification approach?	Very important	
		Important	
		Slightly important	
		Fairly important	
		Not important	

7.4 Coding In-Depth Interviews

7.4.1 Coding Rating of Each Question

To systematically prioritise the qualitative data and ensure thematic comparability across interviewees and sectors, all codes were evaluated using a structured four-level relevance matrix. This semi-quantitative rating scheme allowed for an assessment of how central each code was in relation to the three research questions (RQ1–RQ3).

Symbol	Points	Icon	Assessment the category
	4		very useful / important
	3		imaginable
	2		less imaginable
	1		not imaginable / not important

Figure 7-1: Code overview for in-depth interviews

This rating enabled systematic comparison of sectoral interpretations and helped identify patterns of convergence and divergence. The results were visualised through a coding matrix and used to inform both the quantitative phase (see Subsection 3.3.4) and the triangulation of findings (see Section 5.2).

A summary of the relevance scores per thematic cluster is provided in the table below:

Table 7-3: Summary of the relevance scores per thematic cluster

Theme No.	Thematic Cluster	Relevance Range (avg.)
0	Halal interpretation	3.2 – 3.6
1	Background and significance	3.0 – 3.4
2	Strategic implications	2.9 – 3.4
3	Certification standards	3.1 – 3.7
4	Holistic understanding	2.7 – 3.5
5	Certification process and	2.6 – 3.4
6	Opportunities and barriers	3.0 – 3.3

These numerical scores were not used for statistical generalisation but rather as a qualitative-analytical guide to highlight dominant patterns and outlier perspectives.

7.4.2 Coding Categories

The following thematic categories and subcodes were developed inductively during the qualitative analysis phase. Codes were refined iteratively and clustered by thematic proximity to the three research questions. The logic of this structure directly informed the design of the quantitative survey and the implementation guideline.

Table 7-4: Coding categories for in-depth interview questions

Theme 0: Halal interpretation
Religion / Islam / Quran
Animal-based / meat / food
Affiliation / behaviour / community
Interpretative flexibility
Theme 1: Background and significance of halal certification
1. Reasons for consumption: Religious requirement, faith, society / tradition
2. Cultural and religious influence: Status, personal identity, country differences
3. Additional factors: Community recognition, lifestyle trend, quality signal, political tool
Theme 2: Possible implications of halal certification
4. General importance: Corporate relevance, country-specific context, differentiation
5. Strategic impact: Market positioning, growth, portfolio strategy
6. Dealing with implications: Strategic decisions, operational relevance, internal conflicts
Theme 3: Certification standards
7. Benefits: Reliability, purchasing relevance
8. Implementation effort: Manufacturing processes, resource allocation
9. Improvements: Dialogue, training and role clarity
Theme 4: Holistic understanding
10. Market awareness: Muslim target group, certifiers' role
11. Integration: Strategy alignment, vision, corporate culture
Theme 5: Halal certification process
12. Process complexity: Country-specific requirements, local implementation
13. Process models: Varying stringency, pragmatism
14. Implementation challenges: Complexity, resources, communication, customer trust
15. New business processes: Halal as driver, cost/profitability factors
16. Digital tools: Efficiency, digitalisation driven by halal.
Theme 6: Opportunities and barriers of a holistic approach
17. Opportunities: Differentiation, agility / simplified processes
18. Barriers: Limited resources, interpretative scope
19. Approach impact: Transparency, competence, competitive edge, customer trust, Muslim community perception

7.4.3 Coding Results – Chemical Sector

Table 7-5: Coding results from chemical sector

	Participant	2	4	7	8	11	12	14
Theme 0	**Halal interpretation**	chemical sector						
0	Interpretation							
	Religion / Islam / Quran	↗	↗	↑	↗	↗	↗	↗
	Animal based / Meat / Food		↗	↗	↗		↗	
	Affiliation / Behaviour / Community					↗		
	Room for interpretation available	↗		↗		↘	↗	
Theme 1	**Background and significance of Halal certification**	chemical sector						
1	Reasons for consumption of halal goods							
	Religious requirement		↗	↗	↗	↑	↗	↗
	Faith	↑	↗	↗	↗		↑	↗
	Society / Tradition	↗	↑	↗		↗		
2	Influence of religion, culture and values							
	Status / Significance	↗	↗	↗	↗	↗	↗	↗
	Personal identification		↑		↑		↗	
	Differences by country	↗	↗	↑		↑	↑	↗
3	Additional influencing factors							
	Appreciation by community			↘	↘			↗
	Part of lifestyle (trend)		↗		↗		↗	
	Quality criteria		↗	↗	↘	↑	↑	↘
	Political instrument of the countries / Governments	↗		↗		↗		↘
Theme 2	**Possible implications of Halal certification**	chemical sector						
4	Importance of halal certification							
	Corporate strategy / Business	↗			↘	↗	↘	↘
	Country specific		↗	↑		↗	↗	↑
	Differentiating factor	↘	↗			↘	↗	↗
5	Strategic implications							
	Market positioning		↗	↗		↗	↗	
	Growth				↗		↑	
	Portfolio strategy	↗	↑	↗	↗	↗	↗	↗
6	Dealing with these impacts							
	Basic strategic decision	↗		↗	↑	↑	↗	
	Operational business		↗	↑	↗	↑	↗	↗
	Conflicting interests	↗	↗		↗	↗		↗
Theme 3	**Certification standards**	chemical sector						
7	Benefits of the general certification standards							
	Reliability & Safety through standards	↗	↗	↗	↗	↗	↑	↗
	Precondition for purchase decision		↑	↗	↑	↑	↑	↗
8	Effort of implementing halal standards							
	Manufacturing processes	↑	↘	↑	↑	↗	↑	↗
	Commitment of resources	↗		↗	↗	↗		↗
9	Measures for improving halal standards							
	Dialogue / Awareness raising		↗	↗		↗	↗	
	Roles & responsibilities and training	↗		↗				↗
Theme 4	**Importance of a holistic understanding**	chemical sector						
10	Understanding market requirements							
	Muslims as the primary target group	↗	↗	↘	↓	↗	↘	↘
	Certifiers		↗	↗			↗	↘
11	Integration of the holistic approach							
	Strategy, vision and corporate culture	↗	↗		↗	↑	↑	↗
Theme 5	**Halal certification process**	chemical sector						
12	Different processes and complexity							
	Consider country-specific requirements	↗	↗	↗	↗	↑	↗	↗
	Implement country-specific processes	↗	↗	↑	↘	↗	↗	
13	Process approach: One or more							
	Rigour of requirements	↗	↗	↗	↗	↗	↗	↗
	Variations of action / Pragmatism	↗	↑	↗	↗	↗	↑	
14	Challenges of implementation							
	Complexity of requirements	↗	↑	↗	↗	↑	↑	
	Strategic decision (resources, continuity)	↗		↑	↗		↗	↗
	Communication / Pragmatism		↗		↗			↗
	Convincing customers of seriousness							
15	Business processes							
	Halal as a driver	↘	↗	↘	↗	↘	↓	↓
	Profitability and resources (pragmatics)	↗	↗	↗	↘	↗	↗	↗
16	Digital tools to support halal certification							
	General: efficiency and flexibility		↑	↗	↘		↗	
	Driver: halal / Purpose in itself		↗		↗	↘		↘
Theme 6	**Opportunities and barriers of a comprehensive approach**	chemical sector						
17	New opportunities for the company							
	Business opportunities through differentiation	↗	↗	↑	↘	↑	↗	↗
	Process simplification / Manageability / Agility		↗	↗	↗	↗	↗	
18	Barriers, influences							
	Resource constraints / Complexity reasons			↗			↗	↗
	Requirements / Scope for interpretation	↗	↗			↗	↗	
19	Impact of the comprehensive approach							
	on the company (internal)							
	Transparency of processes / Competence building	↗		↗		↗	↗	
	Competitive advantage /							
	Unique selling proposition for customers	↗	↗	↑	↑	↗	↗	↗
	on the Muslim community (external)							
	Perception of customers	↗	↗	↑	↗	↗	↘	↗

7.4.4 Coding Results – Pharmaceutical Sector

Table 7-6: Coding results from pharmaceutical sector

	Participant	1	3	5	6	9	10	13	
Theme 0	**Halal interpretation**			pharmaceutical sector					
0	Interpretation								
	Religion / Islam / Quran	↗	↗	↗	↗	↘	↗	↗	↗
	Animal based / Meat / Food	↗	↗		↗	↗	↗	↗	↗
	Affiliation / Behaviour / Community		↗		↗	↗	↗		↗
	Room for interpretation available			↗	↗				↗
Theme 1	**Background and significance of Halal certification**			pharmaceutical sector					
1	Reasons for consumption of halal goods								
	Religious requirement	↗	↗	↗	↗	↗	↗	↗	↗
	Faith	↗	↗	↗		↗			↗
	Society / Tradition	↗			↗	↗	↗	↗	↗
2	Influence of religion, culture and values								
	Status / Significance	↑	↑	↗	↗	↑	↑	↗	↑
	Personal identification	↗			↗	↗	↗	↗	↗
	Differences by country	↗	↗	↗		↑	↑	↗	↑
3	Additional influencing factors								
	Appreciation by community		↗		↗	↗	↗		↗
	Part of lifestyle (trend)	↗			↗	↗		↗	↗
	Quality criteria	↗	↗	↗		↗	↗		↗
	Political instrument of the countries / Governments	↑	↗		↗	↗	↗	↗	↗
Theme 2	**Possible implications of Halal certification**			pharmaceutical sector					
4	Importance of halal certification								
	Corporate strategy / Business	↘	↘	↗	↘	↗	↓	↗	↘
	Country specific	↗	↗	↗		↗		↗	↗
	Differentiating factor	↘			↘		↘	↗	↘
5	Strategic implications								
	Market positioning		↗		↗	↗	↗	↗	↗
	Growth	↘		↘		↗		↗	↗
	Portfolio strategy	↗	↗	↗	↘	↗	↗	↗	↗
6	Dealing with these impacts								
	Basic strategic decision	↑	↑	↑	↑	↗		↗	↑
	Operational business	↗	↗	↗		↗	↘	↘	↗
	Conflicting interests	↗			↗		↘	↘	↗
Theme 3	**Certification standards**			pharmaceutical sector					
7	Benefits of the general certification standards								
	Reliability & Safety through standards	↑	↑	↑	↗	↗	↑	↗	↑
	Precondition for purchase decision	↑	↑		↑	↑	↗	↗	↑
8	Effort of implementing halal standards								
	Manufacturing processes	↗	↗		↗	↗		↗	↗
	Commitment of resources	↗	↗	↗	↗	↗	↘	↗	↗
9	Measures for improving halal standards								
	Dialogue / Awareness raising		↗		↗	↗			↗
	Roles & responsibilities and training		↗			↗		↗	↗
Theme 4	**Importance of a holistic understanding**			pharmaceutical sector					
10	Understanding market requirements								
	Muslims as the primary target group	↑	↑		↗	↑	↗	↗	↑
	Certifiers	↗	↗	↗		↗	↗	↗	↗
11	Integration of the holistic approach								
	Strategy, vision and corporate culture	↘	↗	↗	↗	↘	x	↗	↗
Theme 5	**Halal certification process**			pharmaceutical sector					
12	Different processes and complexity								
	Consider country-specific requirements	↗	↗	↗	↗	↗	↗	↗	↗
	Implement country-specific processes	↘	↘		↘	↘		↘	↘
13	Process approach: One or more								
	Rigour of requirements	↗		↗	↗	↗		↗	↗
	Variations of action / Pragmatism	↗	↗	↗	↗	↑	↑	↗	↑
14	Challenges of implementation								
	Complexity of requirements	↗	↗	↑	↑	↗		↗	↑
	Strategic decision (resources, continuity)		↗	↗	↗				↗
	Communication / Pragmatism				↗		↗	↗	↗
	Convincing customers of seriousness						↑		↑
15	Business processes								
	Halal as a driver	↘	↗	↘	↗	↘	↓	↓	↘
	Profitability and resources (pragmatics)	↗	↗		↗	↗	↗	↗	↗
16	Digital tools to support halal certification								
	General: efficiency and flexibility	↗	↗	↘	↗	↗	↗	↗	↗
	Driver: halal / Purpose in itself	↘	↗	↘		↘	↗	↗	↗
Theme 6	**Opportunities and barriers of a comprehensive approach**			pharmaceutical sector					
17	New opportunities for the company								
	Business opportunities through differentiation	↗	↗	↗	↗	↗	↗		↗
	Process simplification / Manageability / Agility	↗	↗		↗	↗		↗	↗
18	Barriers, influences								
	Resource constraints / Complexity reasons		↗	↗	↗		↘	↗	↗
	Requirements / Scope for interpretation	↗		↗				↗	↗
19	Impact of the comprehensive approach								
	on the company (internal)								
	Transparency of processes / Competence building	↗	↗	↗	↑	↗			↗
	Competitive advantage /								
	Unique selling proposition for customers	↗	↗		↗		↗	↗	↗
	on the Muslim community (external)								
	Perception of customers	↗	↗	↘	↑		↗	↗	↗

7.5 Extended Matrix of Triangulated Findings, Research Question and Halal Guideline

Table 7-7: Extended matrix of triangulated findings, research question and halal guideline

Research Question	Qualitative Findings (Section 4.1)	Quantitative Findings (Section 4.2)	Theoretical Framework	Halal Checklist (Section 2.5)	Halal Guideline (Section 5.4)
RQ 1: What are the religious, cultural, and regulatory requirements for halal certification of chemical and pharmaceutical goods?	Ambiguities regarding critical substances (e.g. ethanol, enzymes); inconsistent requirements across certifiers; lack of clarity on cleaning procedures and auxiliary materials	75% (chemical) and 70% (pharmaceutical) correctly defined halal, yet open responses revealed practical uncertainties—under scoring the need for clearer, standardised criteria	Significant international variation in the interpretation of Islamic principles (see Chapter 2.4); diverging strictness in Malaysia, Indonesia, UAE	The developed halal checklist incorporates the requirements of countries with the strictest global halal standards (e.g. Malaysia, Indonesia, UAE, Turkey). It reflects key practical challenges and serves as an operational reference tool, translating religious, regulatory and procedural demands into concrete, auditable measures	Establishing regulatory transparency – theological requirements are translated into auditable specifications, supported by internal awareness-raising.
RQ 2: What are the key challenges and opportunities for the German chemical-pharmaceutical sector in aligning with the requirements of the halal market?	Lack of internal knowledge; limited training; high documentation burden; simultaneously: recognition of market potential and image-building effects	67% cited resource constraints; 61% unclear certification conditions; >70% see strategic potential	Sections 2.6–2.9: Rising global demand; lack of mutual recognition among certifiers; Germany has a strong systemic position		Business case and strategy integration – Developing an economic assessment and embedding halal certification within quality management systems, governance structures, and supplier management in order to leverage market opportunities despite organisational challenges.
RQ 3: What systematic guidelines can be developed to help the German chemical-pharmaceutical manufacturing sector successfully tap into the potential of the halal market?	Strong demand for a five-step implementation guideline; recommendation to involve external halal experts	Over 80% requested standardised tools (e.g. checklists, templates); high need for clear guidance	Sections 2.5 & 2.10: Operational tools lacking in Germany; best practices established internationally (e.g. HalMQ, HAS)		Analysing framework conditions & operational implementation – Context analysis of the German regulatory environment, followed by practical implementation through the use of a checklist, staff training, internal integration, and structured audit preparation, supported by a clearly defined distribution of internal and external responsibilities.

7.6 Halal Requirements: Category Views

Table 7-8: Category view: area, halal, application

Category	No	Area	Halal	Halal (example)	Application in the chemical-pharmaceutical sector (halal example)
Raw materials & ingredients	a	Animal-based (aquatic animals)	Fish and seafood	Tuna, crabs, pikeperch; without having to be slaughtered - except poisonous	Omega-3 fatty acids: dietary supplements, cardiovascular drugs. Algae extracts: Antioxidants, digestive support.
Raw materials & ingredients	b	Animal-based (land animals / predators)	Cattle, lambs, goats, buffalo, deer, camels, chickens, turkeys, pigeons, ostriches, geese, swans, ducks	Animals and birds must also be alive and healthy at the time of slaughter	Cosmetics market: skin care, hair care and anti-ageing products. Squalene: Skin care, moisturisers, anti-ageing.
Raw materials & ingredients	c	Ethanol in the recipe	Use of ethanol in production	Formulation contains ethanol, which is not completely distilled out and remains in the end product	Aloe vera: skin care, after-sun products
Raw materials & ingredients	d	Petrochemical raw materials	Products made from natural gas and petroleum fractions	Petroleum and natural gas based materials	Mineral oil: moisturisers, skin care products, baby oils. Isopropyl myristate: Skin care, hair care, make-up.
Raw materials & ingredients	e	Slaughter (animals)	Slaughterhouse operators and supervisors	Rules and conditions of slaughter in Islam are known (ritual slaughter)	Supplier: Slaughter of animals according to Islamic rules
Raw materials & ingredients	f	Slaughter (tools)	Sharp, single-edged cutting tool	Anaesthesia is permissible as long as the animal / bird does not die as a result;	Supplier: Slaughter of animals according to Islamic rules
Raw materials & ingredients	g	Vegetable-based	Vegetable-based raw materials	lauric oils, rapeseed oils, dextrose	Coconut oil: skin care, hair care, cleansing products.
Logistics & warehousing	h	Product filling and loading	Dedicated halal lines	Filling and loading lines are dedicated for halal products	exclusively halal-certified products on halal-dedicated lines
Logistics & warehousing	i	Product storage	Halal-compliant storage of products	Dedicated halal warehouses	Separate storage of halal and haram goods
Logistics & warehousing	j	Product transport to the customer	halal-compliant transport of the products	The transport route for halal-certified products is dedicated	Transport lorries exclusively transport halal products
Logistics & warehousing	k	Raw material procurement	Halal-compliant production and logistics for the procurement of raw materials	Supplier: Production and logistics for the procurement of raw materials is halal-certified	Ethanol is distilled down to a limit value
Logistics & warehousing	l	Raw material storage	Halal-compliant storage of raw materials	Raw materials are stored in a halal-certified field	The supplier confirms halal conformity through certificates exclusively halal-dedicated and halal-certified storage
Manufacturing & processing	m	Ethanol in the process	No use of ethanol as an ingredient	Ethanol as an additive, which is distilled off	
Manufacturing & processing	n	Product manufacture	Entire production process is halal certified	all production steps are halal-certified	Use of possible auxiliary materials, exhaust air or energy lines is halal-compliant
Manufacturing & processing	o	Product packaging	Packaging materials have halal certificates	Halal-compliant materials and processes for packaging	The packaging has the corresponding halal certificates
Manufacturing & processing	p	Product plants	Entire production line has been evaluated and is halal-certified	All production steps are halal-certified	All steps of the manufacturing process are considered as a whole
Audits & documentation	r	Audits	Successful halal audits	Regular internal and external audits to check halal standards with final certification	Regular halal audits are carried out at regular intervals (usually annually)
Audits & documentation	s	Overall processes and work instructions	Documentation of manufacturing processes and work instructions is halal-certified	Documentation of all production processes and instructions to ensure halal compliance; halal certification by an accredited organisation after evaluation of all documents	All processes and work instructions are documented and implemented by the relevant executives; documents are regularly reviewed
Genetic modified organisms & Enzymes	t	Genetically modified organisms	Compliance with halal conformity	Compliance with halal conformity according to Islamic regulations	Raw material is halal-certified, no animal (haram) origin
Genetic modified organisms & Enzymes	u	Enzymes	Compliance with halal conformity	Use of enzymes that come from halal-compliant sources	Raw material is halal-certified, no animal (haram) origin

Table 7-9: Category view: grey area, haram

Category	No	Area	Grey area / room for interpretation (example)	Haram	Haram (example)
Raw materials & ingredients	a	Animal-based (aquatic animals)	Differentiation between fish with scales (halal) and other marine animals (room for interpretation)	Intoxicating or dangerous species for human health	Sharks, poisonous snakes
Raw materials & ingredients	b	Animal-based (land animals / predators)	Influence and type of animal husbandry and animal treatment	Pork and carnivores	Pork, carnivores or birds of prey with claws, fangs or tusks; dirty or dangerous animals; blood and carcasses
Raw materials & ingredients	c	Ethanol in the recipe	Distinguishing between different types of alcohol (e.g. ethanol, methanol) and their use. Limit values in products.	Use of ethanol	Use of ethanol
Raw materials & ingredients	d	Petrochemical raw materials	Dealing with cross-contamination with non-halal materials in logistics	Mixing with prohibited materials	Alternate use of the same storage tank for lala and haram materials
Raw materials & ingredients	e	Slaughter (animals)	Muslim as butcher	Rules and conditions of slaughter not known in Islam	Animal is not slaughtered by a Muslim or method contradicts Islamic principles
Raw materials & ingredients	f	Slaughter (tools)	Slaughtering of non-halal animals in the same plant complex	Unsharp objects; death by stunning	The tool must not contain a claw, tooth or nail; animal/bird dies as a result of anaesthesia
Raw materials & ingredients	g	Vegetable-based	Ensuring that vegetable-based ingredients do not contain prohibited additives or contaminants	Use of alcohols in further processing	Ethanol as a component of a recipe
Logistics & warehousing	h	Product filling and loading	Product lines handling halal and haram materials are cleaned when changed	Filling and loading lines are not halal-certified	Haram-certified materials are also moved through corresponding lines
Logistics & warehousing	i	Product storage	Storage of packaged halal and haram products in one hall	halal and haram materials in one warehouse	halal and haram materials in one warehouse
Logistics & warehousing	j	Product transport to the customer	Utilisation of means of transport for halal and haram materials	Transport of products not halal-compliant	Transport lorries transport halal and haram materials
Logistics & warehousing	k	Raw material procurement	Checking halal conformity	Contamination of halal raw materials with haram raw materials during production (at the manufacturer)	The manufacturer and supplier of the raw material does not have a corresponding halal certificate
Logistics & warehousing	l	Raw material storage	Cross-contamination with non-halal raw materials, e.g. through a common exhaust air system	Storage of prohibited raw materials in the same tank / field	A storage tank or warehouse temporarily and repeatedly stores raw materials of pork origin
Manufacturing & processing	m	Ethanol in the process	Residual ethanol limits vary	Ethanol as part of the chemical formulation	Residual ethanol remains in the final product above accepted limits
Manufacturing & processing	n	Product manufacture	Consideration of the preliminary stages	Contact with haram materials	Use of ethanol in the process, an exhaust air pipe is connected to a haram reactor (blowback)
Manufacturing & processing	o	Product packaging	Consideration of the preliminary stages	Contact with haram substances	The manufacturer / supplier of the used packaging uses haram materials during product
Manufacturing & processing	p	Product plants	Cleaning and inspection of production facilities to ensure halal compliance	haram / non-halal materials in the production line	halal materials are in contact with, mixed with or in close proximity to non-halal materials during production
Audits & documentation	r	Audits	Required level of detail partially interpretable	Halal audits are not carried out / not passed	No confirmation of halal certification
Audits & documentation	s	Overall processes and work instructions	Necessary level of detail partly interpretable	Documentation of processes and work instructions is incorrect and incomplete	There is no or insufficient documentation of the halal guidelines
Genetic modified organisms & Enzymes	t	Genetically modified organisms	Conditions for the use of GMO materials can be interpreted	Genes from haram animals or organisms, impurities	Genetic material from pigs or other haram sources found in GMO used
Genetic modified organisms & Enzymes	u	Enzymes	Conditions for the use of enzymes can be interpreted	Genes from haram animals or organisms, impurities	Enzymes derived from pigs or non-halal slaughtered animals

Table 7-10: Category view: Malaysia, Singapore, Indonesia

Category	No	JAKIM (Malaysia)	MUIS (Singapore)	BPJPH / LPPOM MUI (Indonesia)
Raw materials & ingredients	a	from halal-compliant sources, halal certificate required	from halal-compliant sources, halal certificate required	from halal-compliant sources, halal certificate required
Raw materials & ingredients	b	Slaughtered in accordance with Islamic regulations, halal certificate required for slaughterhouses and products	Slaughtered according to Islamic regulations, halal certificate required for slaughterhouses and products	Slaughtered according to Islamic regulations, halal certificate required for slaughterhouses and products, comprehensive audits
Raw materials & ingredients	c	Manufactured without the use of alcohol in the formulation, halal certificate required	Manufactured without the use of alcohol in the recipe, halal certificate required	Manufactured without the use of alcohol in the recipe, halal certificate required
Raw materials & ingredients	d	halal certificate required for raw materials	halal certificate required for raw materi	halal certificate required for raw materials, focus on controls and audits
Raw materials & ingredients	e	halal-compliant slaughtering methods, halal certificate for raw materials required, high priority given to Islamic slaughtering regulations	halal certificate of raw materials required, documentation of processes	halal certificate required for raw materials, process-orientated with audits
Raw materials & ingredients	f	halal conformity of slaughtering processes necessary, high priority for Islamic slaughtering regulations	halal conformity of slaughtering processes required, sustainability	halal conformity of slaughtering processes required, process-orientated with audits
Raw materials & ingredients	g	halal certificate required	halal certificate required	halal certificate required for raw materials, focus on controls and audits
Logistics & warehousing	h	No contamination with haram, halal certificate required for bottled products	No contamination with haram, halal certificate required for bottled products	No contamination with haram, halal certificate required for bottled products
Logistics & warehousing	i	halal conformity of the warehouses required	halal conformity of warehouses necessary, focus on separate storage	halal conformity of warehouses necessary, strict requirements and audit
Logistics & warehousing	j	halal conformity of transport routes required	halal conformity of transport routes required	halal conformity of transport routes required
Logistics & warehousing	k	from halal-compliant sources, halal certificate required for raw materials	from halal-compliant sources, halal certificate required for raw materials	from halal-compliant sources, halal certificate required for raw materials, strict specifications and audits
Logistics & warehousing	l	halal conformity of the warehouses required	halal conformity of warehouses necessary, focus on separate storage	halal conformity of warehouses required, strict specifications and audits
Manufacturing & processing	m	No residues in the end product, halal certificate as confirmation that no residues of haram substances are present	No residues in the end product, halal certificate as confirmation that no residues of haram substances are present	No residues in the end product, halal certificate as confirmation that no residues of haram substances are present
Manufacturing & processing	n	Overall process must be halal-compliant, raw materials and product must be halal-certified	Overall process must be halal-compliant, raw materials and product must be halal-certified	Overall process must be halal-compliant, raw materials and product must be halal-certified
Manufacturing & processing	o	Packaging must be halal-certified	Packaging must be halal-certified	Packaging must be halal-certified
Manufacturing & processing	p	Overall process must be halal-compliant, product must be halal-certified	Overall process must be halal-compliant, product must be halal-certified	Overall process must be halal-compliant, product must be halal-certified, strict specifications and audits
Audits & documentation	r	Part of the certification process, halal certification required for companies	Part of the certification process, halal certification required for companies	Part of the certification process, halal certification required for companies
Audits & documentation	s	The entire process must be halal-certified	Overall process must be halal-compliant, product must be halal-certified	Overall process must be halal-compliant, product must be halal-certified, training courses
Genetic modified organisms & Enzymes	t	halal certification of GMO materials required	halal certification of GMO materials required	halal certification of GMO materials required
Genetic modified organisms & Enzymes	u	halal certification of the enzymes required	halal certification of the enzymes required	halal certification of the enzymes required

Table 7-11: Category view: Turkey, UAE, strongest requirements

Category	No	TSE / HAK (Turkey)	ESMA (UAE)	Strongest halal-requirements
Raw materials & ingredients	a	from halal-compliant sources, halal certificate required, regular checks of the supply chain	from halal-compliant sources, halal certificate required, significant emphasis on documentation	Raw materials / ingredients from aquatic animals require halal-compliant sources, halal certificate for these raw materials is required, documentation and regular review of supply chains
Raw materials & ingredients	b	Slaughtered in accordance with Islamic regulations, halal certificate required for slaughterhouses and products, regular inspections	Slaughtered in accordance with Islamic regulations, halal certificate required for slaughterhouses and products	Raw materials / ingredients must be slaughtered in accordance with Islamic regulations, halal certificate required for slaughterhouses and products, regular checks through comprehensive audits
Raw materials & ingredients	c	Production without the use of alcohol in the recipe, halal certificate required	Production without the use of alcohol in the recipe, halal certificate required	Production without the use of alcohol in the recipe, halal certificate required
Raw materials & ingredients	d	halal certificate required for raw materials	halal certificate required for raw materials	Halal certificate required for raw materials, focus on controls and audits
Raw materials & ingredients	e	halal certificate for raw materials required, process-orientated with audits	halal-compliant slaughter methods, halal certificate for raw materials required, documentation of processes	Halal-compliant slaughtering methods and halal certificate for raw materials required, focus on Islamic slaughtering regulations, documentation of processes
Raw materials & ingredients	f	halal conformity of slaughtering processes required	halal conformity of slaughter processes required	halal conformity of slaughtering processes necessary, high priority given to Islamic slaughtering regulations, process-orientated approach with audits
Raw materials & ingredients	g	halal certificate required	halal certificate required	halal certificate required for raw materials, focus on controls and audits
Logistics & warehousing	h	No contamination with haram, halal certificate required for bottled products	No contamination with haram, halal certificate required for bottled products	No contamination with haram, halal certificate required for bottled products
Logistics & warehousing	i	halal conformity of warehouses required	halal conformity of warehouses required	halal conformity required for the storage of products, focus on separate storage, focus on compliance with specifications and audits
Logistics & warehousing	j	halal conformity of transport routes required	halal conformity of transport routes required	halal conformity of transport routes required
Logistics & warehousing	k	from halal-compliant sources, halal certificate required for raw materials	from halal-compliant sources, halal certificate required for raw materials	Procurement of raw materials from halal-compliant sources, halal certificate required for raw materials, strict specifications and audits
Logistics & warehousing	l	halal conformity of warehouses required	halal conformity of warehouses required	halal conformity required for the storage of raw materials, focus on separate storage, focus on compliance with specifications and audits
Manufacturing & processing	m	No residues in the end product, halal certificate as confirmation that no residues of haram substances are present	No residues in the end product, halal certificate as confirmation that no residues of haram substances are present	No ethanol residues in the end product, halal certificate as confirmation
Manufacturing & processing	n	Overall process must be halal-compliant, raw materials and product must be halal-certified	Overall process must be halal-compliant, raw materials and product must be halal-certified	Overall process must be halal-compliant, raw materials and products must be halal-certified
Manufacturing & processing	o	Packaging must be halal-certified	Packaging must be halal-certified	Packaging must be halal-certified
Manufacturing & processing	p	Overall process must be halal-compliant, product must be halal-certified	Overall process must be halal-compliant, product must be halal-certified	Overall process must be halal-compliant, product must be halal-certified, focus on compliance and audits
Audits & documentation	r	Part of the certification process, halal certification required for companies	Part of the certification process, halal certification required for companies	Part of the certification process, halal certification required for companies
Audits & documentation	s	Overall process must be halal-compliant, product must be halal-certified	Overall process must be halal-compliant, product must be halal-certified	Overall process must be halal-compliant, product must be halal-certified, training courses
Genetic modified organisms & Enzymes	t	halal conformity required, halal certificate of the end product	halal conformity necessary, halal certificate of the end product	halal certification of GMO materials required
Genetic modified organisms & Enzymes	u	halal certification of the enzymes required	halal conformity necessary, halal certificate of the end product	halal certification of enzymes required