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Original Research Article

The Tapestry of Halal-Related Projects in IIUM – The Funding and Its Outputs

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Abstract: Understanding of funding trends and its outputs can assist stakeholders in making informed decisions that maximizes the value and impact of research and innovation investments. While the trend of research articles related to halal is increasing, there is no report on the trend of funding and its output. This study aims to fill in this gap by identifying the funding trends and outputs of halal-related research projects using the sampling population from the Research Management Centre (RMC) at the International Islamic University Malaysia. Upon obtaining access permission, 59 research projects related to halal were obtained and 41 projects were included after screening. The funding trend over the years (2012–2022) was found to be not linear with a particular decrease during the Covid-19 pandemic. The projects (total of RM3.4million) were funded in the range of RM 10K–RM 300K mostly by the Ministry of Higher Education (MOHE). Most of the talents nurtured were at Master level. Only 26% of the projects produced intellectual properties. A total of 77 journals were published with 55 % were indexed in either Science (WOS), Scopus, or MyCite. Only one journal article was indexed as Q2 and none was indexed in Q1. No significant correlation was found between the total grant (RM) with total publications. To this end, this study provides insight into areas of priority in halal research and development. This would benefit many stakeholders and enable relevant entities to weigh the priorities and future-proof the halal industry through appropriate strategic funding and policy making.

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1. Introduction

Idea and execution are the two most important components in research projects, along with the availability of infrastructure and facilities to achieve successful execution of any research work (Neema, 2021). Thus, in fulfilling the research aims, monetary support is of paramount importance to cover the cost of travel, contingency, stationeries, hiring of trained personnel, purchase of equipment, consumables, and publication (Akram *et al*., 2022). This monetary support, commonly referred to as funding or grants is commonly divided into four categories based on the funders: research grant by the university, research grant by the ministry, research grant by industry/private sector, and research grant by international funding bodies (Pusat Pengurusan Penyelidikan (RMC) UTHM, 2021).

Funding is positively associated with the output of research (Drivas *et al*., 2015) and has been reported to play a role in engagement of academic research work (Hooi & Wang, 2019). However, there were cases where funding was found to have no association with the output. For instance, it was observed that a budget cut of 19.23% in 2017 (from RM 7.57 billion received a year before) for higher education public universities in Malaysia still contributed to the country's rank (at 39th) out of 50 countries for the research output and its impact, institutional excellence, and graduate employability (Abdullah, 2017).

As with other sectors, the halal sector is also envisaged to be positively impacted by research, development and innovation (R&D&I) where the outputs could and should be translated into real applications and solutions in the industry (Papalampropoulou-Tsiridou, 2021) . Recent trend showed an ever-increasing demand from the market for halal products and services. In meeting this demand, more R&D&I are required. However, the number of researchers working in the halal field is still small and data on commercialized research and registered patents related to halal is still limited. The Halal Development Corporation (HDC) has identified that there is inadequate product creation and innovation by Malaysia's halal economic players (World Bank Group, 2022).

In the halal industry, research plays a crucial role in expanding knowledge and uncovering new findings, which in turn helps meet the needs and provide solutions for stakeholders. Ahmad *et al*. (2011) emphasized the importance of not overlooking halal-related studies and knowledge to ensure the industry's sustainability (Aziz *et al*., 2015). In Malaysia, for example, the halal industry has received significant support from academia in terms of research and development, as well as in nurturing human resources (Zain *et al*., 2017). However, other studies have highlighted an imbalance between research in halal areas and the industry's growth, with research struggling to keep pace with the rapid expansion of the industry. To this end, a growth of R&D&I in Malaysia is crucial to sustain its longstanding (more than a decade) status as the global halal trade sector (Dinar Standard, 2023).

In general, works regarding the relationship between research funding and outputs is very limited despite its importance. Understanding the trends in research output and funding offers several benefits. This includes identification of research priorities and gaps, efficient allocation of resources, tracking of progress and innovation, forecasting future needs and challenges, and evaluation of impacts of investments. Table 1 shows some previous work related to funding trends and research output with their respective elements studied. Existing studies have primarily focused on well-established fields like health and engineering, often emphasizing on publication metrics. No specific study has been done in the halal-related area. As such this present study fills a unique gap by examining funding trends and outputs specifically within halal-related research.

Table 1. Studies related to funding trend and research output.

No.	Research Focus	Country	Element of Funding Trend Studied	Research Output Studied	References
1	All field	Western Europe	Year, funder, funding amount	Publication	Hussinger & Carvalho, (2022)
2	All field	South America	NA	Publication	Armijos Valdivieso *et al*., (2022)
3	Health	Pakistan	Year, funder, funding amount	Publication	Saqib & Rafique (2021)
4	Biomedical	Australia	Year, Funder	Publication, commercial contracts, invention disclosures, patent applications, IP	Webster *et al*., (2021)
5	Not stated	China & EU	Year, Funder	Publication	Wang *et al*., 2020)
6	Science, Technology, Engineering and Mathematics (STEM)	Singapore	Funder	Patent licensing, consultancy, advisory, academic spin-off	Hooi & Wang, (2019)
7	Health	Malaysia	Year, Funder	Publication	Fun *et al*., (2019)
8	All field	Malaysia	Year, Field, funding amount	Publication, citation	Henry *et al*., (2018)
9	Agricultural Science	Greece	Year, Funder, funding amount	Publication, citation, patent	Drivas *et al*., (2015)
10	All field	Italy	Year, Funder, field	NA	Muscio *et al*., (2014)
11	Pure science and engineering	Korea	NA	Publication, patent	Kim, (2014)
12	Health	United States	Year, Funder	Publication, citation	Jacob & Lefgren, (2011)
13	All field	New Zealand	Year, Funder	Publication	Smart (2009)

Despite the increasing trend of research articles related to halal, there is a significant gap in understanding the associated funding trends and their outputs, which is crucial for effective decision-making by stakeholders. Considering the current development of the halal industry which has high demands in the market and the importance of halal research and development, this study is timely to describe the funding trends and outputs of halal-related research projects. Although the work is undertaken specifically for halal-related research in IIUM (International Islamic University Malaysia), the findings are useful, and the process can be replicated in other settings. The aims of this study are therefore to describe the funding trends and outputs of funding in halal-related research projects in IIUM, as well as the correlation between grant amount (RM) with total publications.

2. Materials and Methods

This study employs quantitative content analysis to examine funding trends and research outputs of halal-related projects at IIUM. Secondary data was obtained from the IIUM Research Management Centre (RMC) database.

The study population consists of final research project reports obtained with permission from the RMC. The sample focuses on halal-related projects awarded to researchers at IIUM by various funding sources. In this context, halal-related projects are defined as those containing the keyword "halal" in the title, keywords, abstract, or executive summary. Using purposive sampling, only projects meeting this criterion were selected.

The dataset includes projects recorded from the earliest available entries up to those completed in 2022. The scope of samples was broad and may include diverse halal sectors such as halal food, halal pharmaceutical, halal business, halal tourism, halal logistics, halal biotechnology, halal personal care products, halal service and transportation.

Checklists and forms were used to extract data concerning funding and outputs. Table 2 shows the type of data collected. Descriptive statistics were applied to summarize funding trends and outputs, while Spearman's correlation analysis was conducted to examine the relationship between grant amounts and total publications.

Table 2. Elements of funding trends and output studied.

Funding Details	Output/Achievement
• Year • Funder • Field/area/scope • Amount approved • Faculty (kulliyyah)	• Talent (Graduate Research Assistant (GRA), Research Assistant (RA) • Publication (number, citation, quality index), • Intellectual property (copyright, patterns, trademark, utility invention, trade secret) • Product, prototype/commercialization • Policy paper

3. Results

This section discusses the funding trends and research project outputs of the halal-related projects in IIUM. Analysis was done from the analysis of 59 recorded projects obtained from IIUM Research Management Centre (IIUM-RMC). After screening based on a set of selection criteria, 41 research projects were included in the analysis of the study.

3.1. Funding Trends

3.1.1. Year

Following data analysis, it was observed that the 41 research projects span over a period of ten years, from 2012 to 2022 (Figure 1). There was an increasing number of projects over the years, with 2012 having the highest number of grants, having a total of 12 projects granted. The year 2013 and 2019 also have considerably high number of projects (9 and 8 projects respectively) in comparison to other years of study. The high number of projects granted in these years might be attributed to the growing demand for research activity on specific topics of halal.

According to the list of the projects provided by the IIUM-RMC, there were no grants provided for any research related to halal in 2014 and 2017. There were eight projects in 2019 but this number substantially dropped to only one project in 2020. This trend could be affected by the outbreak of Covid-19 towards the end of 2019 and early 2020, which resulted in restrictions on movement, and preventing many educational activities, including physical classes, research activities, and field projects. Despite these challenges, research in halal industry remains as an important effort to ensure that the products and services offered in the industry are compliant with the halal standards.

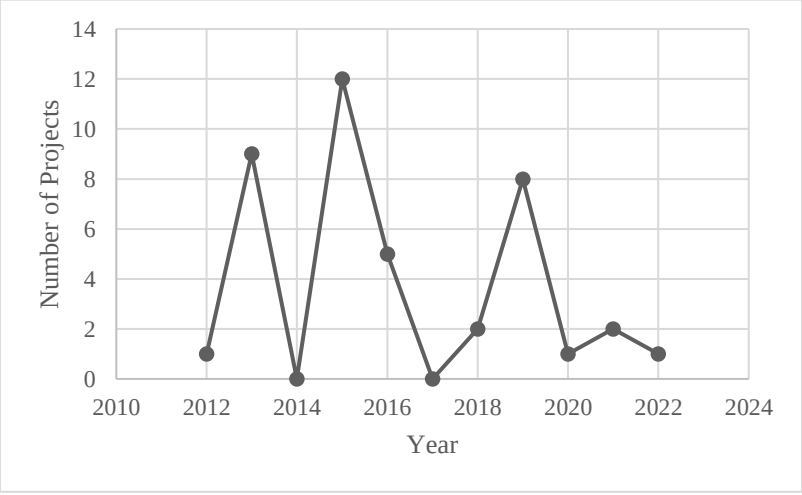

Figure 1. Halal-related research projects conducted by researchers and registered in the IIUM Research Management Centre.

3.1.2 Amount approved

A total of RM 3.4 million was allocated across projects, with individual project funding ranging from RM 10,000 to RM 300,000. Research projects in the science and technology field were observed to acquire a higher amount of funding. The highest amount of funding approved for these projects came from the Ministry of Higher Education under the grant MyRA Incentive Grant Scheme (RM 280,000), and the Trans-disciplinary Research Grant Scheme (TRGS) (RM 252,030).

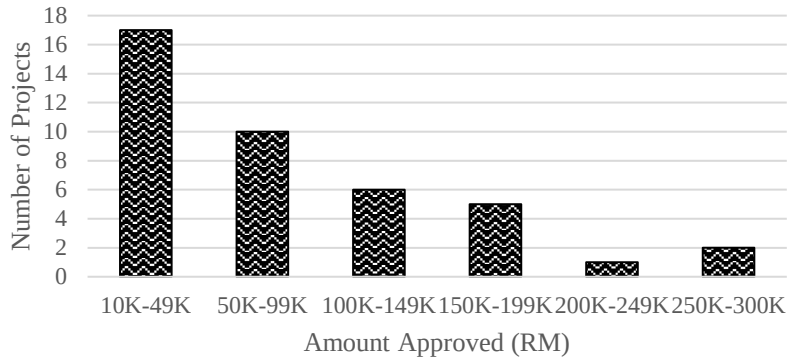

Figure 2. Total grants (RM) approved for the halal-related research projects in IIUM.

3.1.3 Funders

Based on Figure 3, the Ministry of Higher Education was the primary funder for the research grants (26 projects out of total 41 projects). These projects include the Fundamental Research Grant Scheme (FRGS), Malaysian Higher Education Grant (MOHE), Prototype Development Research Grant Scheme (PRGS), Trans-disciplinary Research Grant Scheme (TRGS), Exploratory Research Grant Scheme (ERGS), and MyRA Incentive Grant Scheme. The university sponsored 14 projects, all of which were under the Research Initiative Grant Scheme (RIGS). Only one project was sponsored by a private (local) funder. These findings indicate that the government is the major source of funding for halal related research activities.

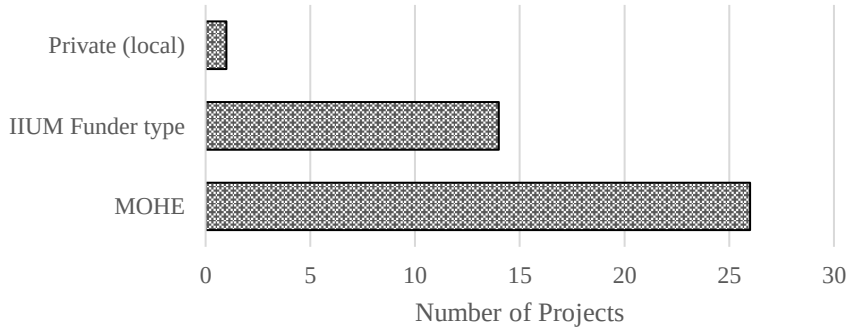

Figure 3. Categories of funder of the halal-related research projects.

3.1.4 Faculty (Kulliyyah)

Looking deeper into the 41 halal-related research projects registered at the Research Management Centre (RMC), it was observed that the projects were conducted by researchers from various faculties (Kulliyyahs) and institute, namely the International Institute for Halal Research and Training (INHART), Kulliyyah of Pharmacy (KOP), Kulliyyah of Engineering (KOE), Kulliyyah of Economics and Management Sciences (KENMS), Kulliyyah of Allied Health Sciences (KAHS), Kulliyyah of Science (KOS), Abdulhamid Abu Sulayman Kulliyyah of Islamic Revealed Knowledge And Human (AHAS KIRKHS), Kulliyyah of Dentistry (KOD), and Kulliyyah of Architecture and Environmental Design (KAED). Based on Figure 4, INHART was observed to be the most active entity, contributing 12 research projects, followed by KOP and KOE. Meanwhile, KAED and KOD had the least number of halal-related research projects, suggesting that they may be focusing on different areas of study.

Notably, since the inception of INHART in 2011, the Institute fulfilled its role in spearheading halal-related activities, particularly in halal research. The research projects from INHART primarily focused on topics such as collagen and gelatine, halal authentication and portable halal devices.

On the other hand, the Kulliyyah of Pharmacy received more funding for research related to halal pharmaceuticals and formulation. This research included the formulation of halal cosmetic products and study on the evolution of halal medication.

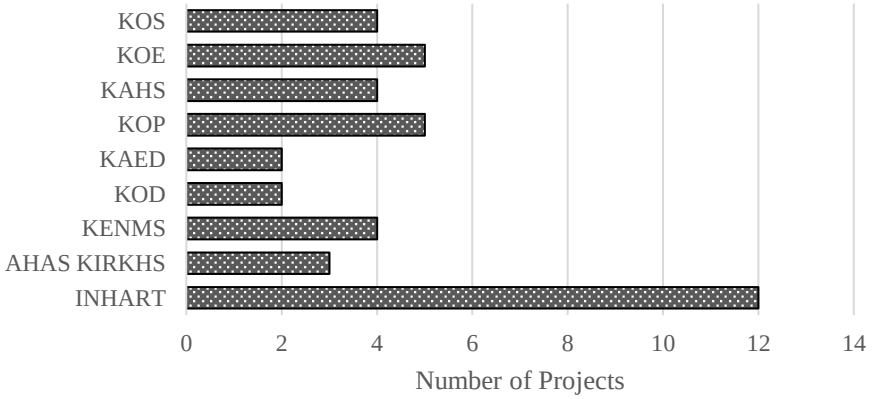

Figure 4. Halal-related research projects based on Kulliyyah(faculty)/institute in IIUM. Kulliyyah of Science (KOS), Kulliyyah of Engineering (KOE), Kulliyyah of Allied Health Sciences (KAHS), Kulliyyah of Pharmacy (KOP), Kulliyyah of Architecture and Environmental Design (KAED), Kulliyyah of Dentistry (KOD), Kulliyyah of Economics and Management Sciences (KENMS), AbdulHamid AbuSulayman Kulliyyah of Islamic Revealed Knowledge and Human Sciences (AHAS KIRKHS) International Institute for Halal Research and Training (INHART).

3.1.5 Field of study

Based on projects reported in Figure 5, most of the research granted are from the science and technology (SnT) field which covers 78% of the total projects. The non-SnT projects (22%) were observed to come from three major kulliyyahs; Abdulhamid AbuSulayman Kulliyyah of Islamic Revealed Knowledge and Human Sciences (AHAS KIRKHS), Kulliyyah of Economics & Management Sciences (KENMS) and Kulliyyah of Architecture and Environmental Design (KAED).

It was observed that there were discrepancies in the categorisation of SnT and non-SnT projects with their respective project titles. This could be due to the categorization practiced by the RMC which was based on the kulliyyah's name. The generalization of the field based on the kulliyyah may not be an accurate process as researchers in a kulliyyah can produce diverse topics in research that could fall either under SnT and non-SnT, or even a multidisciplinary work. Hence, to avoid these discrepancies, it is advisable to consider refining the process of the categorization of SnT and non-SnT projects based on their project titles. The process may involve more in-depth reviews on the research's objectives, scope, and findings to ensure accurate categorization or classification.

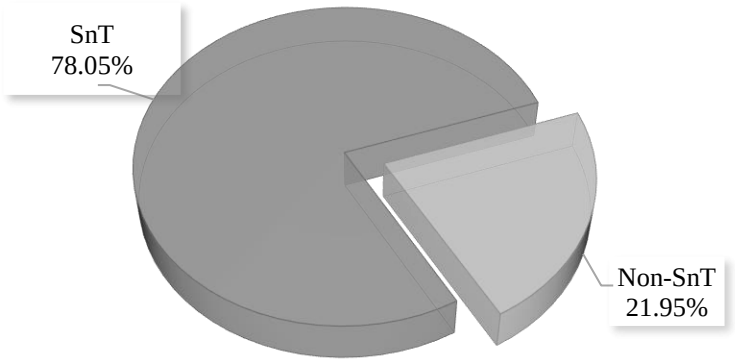

Figure 5. Halal-related research projects categorised into Science and Technology (SnT) and Non-science and Technology (Non-SnT) fields.

In a separate analysis based on the project titles, the classification of the projects was done based on the Global Islamic Economy Report (GIER) sectors. It was observed that the Halal Food was the highest sector among all sectors listed. Halal Pharma also dominated the list with five projects observed to fit this category. Based on Table 3 there was no project under the Muslim Friendly Travel category. There were several areas of studies which did not clearly fit into any of the categories on halal sectors based on the Global Islamic Economic Report (GIER). These studies were categorised into 'others'. This includes the studies related to agriculture, health, technology, engineering, and microbiology.

Table 3. Classification of the projects based on the Global Islamic Economy Report (GIER) sectors.

No.	Sector	Number of Projects
1	Modest Fashion	1
2	Halal Food	15
3	Halal Pharma	5
4	Muslim Friendly Travel	0
5	Media and Recreational	1
6	Islamic Finance	1
7	Halal Cosmetics	2
8	Others	16

3.2. Funding Outputs

3.2.1 Talent

After analysing the data collected from the 41 projects, it was observed that there was a notable difference in the trend of output data across the various categories of projects. In total, the projects produced 59 talents, and it was discovered that Master's students accounted for the highest number of talents with 30 identified (Figure 6). This was followed by Ph.D. students with 15 identified talents. The remaining talents, totalling 14, were categorized as "others," which included undergraduate students and research officers. While it is easy to assume that the amount of grant is positively related to the number of talents nurtured, this is not necessarily the case, particularly when the categories of talents are not clearly defined. For instance, one project that was approved for an amount below RM50,000 reported to produce seven undergraduate students as talents. To this end, it is important for the funder as well as the monitoring agency to be clear of the definition of talent.

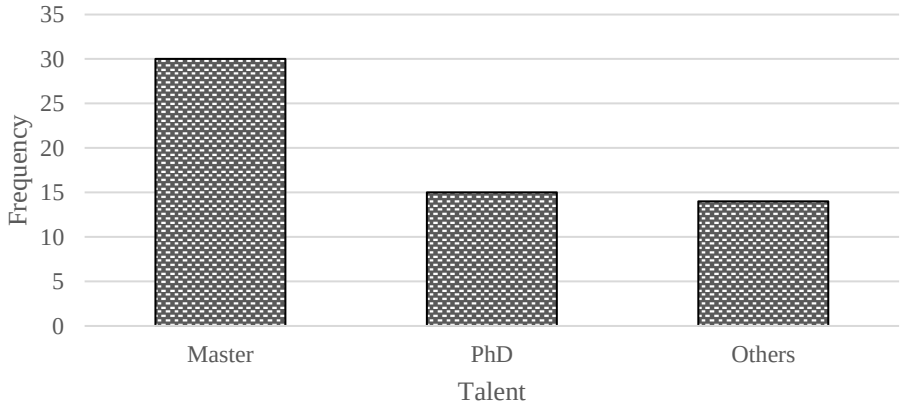

Figure 6. Talents nurtured from the halal-related research projects.

3.2.2 Publications

Publications are the most dominant category in the research output, indicating a high level of productivity among research projects. The publication output was categorised into three

types: journal papers, proceedings, and books. It was observed that journal papers stand out as the most published type, followed by proceedings and books (Figure 7). This indicates that researchers are more inclined towards sharing their findings in journal papers, which are considered a more effective medium for disseminating scholarly research output. Moreover, publishing a journal paper is a requirement set by most funders of the grants which must be achieved by the researchers.

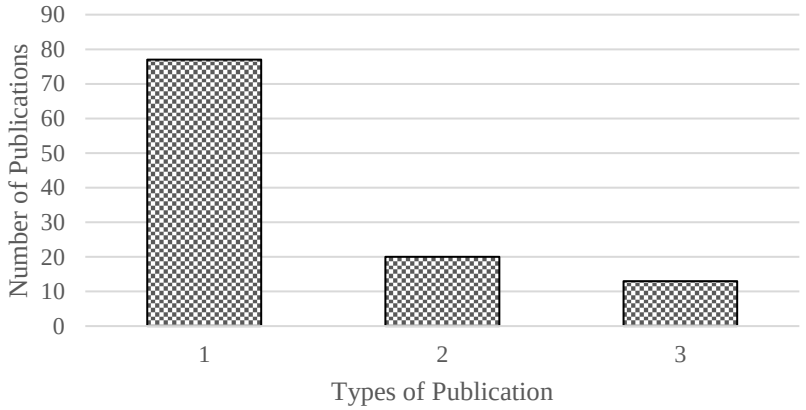

Figure 7. Types of indexed publication output percentages of the halal-related research projects.

Out of 77 journal articles published, 55% are indexed in reputable databases such as Webs of Science (WOS), Scopus, or MyCite for all three types of publications. Scopus emerges as the most popular database for publishing research output, with 51 publications, followed by MyCite and WOS with 30 and 33 publications respectively (Figure 8). The higher number of indexed publications in Scopus as compared to WOS and MyCite is probably due Scopus's vast and more diverse range of content, with a user-friendly interface. Besides, this site offers free author and source information which includes metrics, hence making it more accessible to the public (Pranckutė, 2021). From this analysis, it indicates that the researchers are making exceptional efforts to publish their works in such a high-quality database.

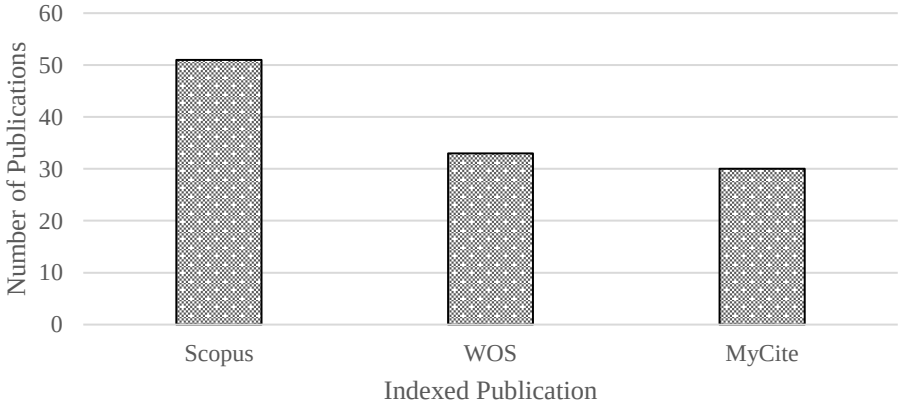

Figure 8. Number of indexed publication output of the halal-related research projects.

Meanwhile, the publication index in WOS revealed that only one article was indexed in Q2 while 17 publications were indexed in Q4 (Table 4). Additionally, some publications were listed under ESCI, which stands for Emerging Sources Citation Index, while others belong to the 'NA' category, which means they were not assigned to any quartile. None of the publications were listed in Q1 or Q3.

Achieving a publication in the Q1 quartile is not an easy process as it involves a series of evaluations and also examinations for the publication's quality performed by experts in the field. Based on Table 4, this study has revealed that the majority of publications only managed to achieve a ranking in Q4. It demonstrates the high level of difficulty in achieving a ranking in the Q1. In the process to prepare for the publication of a paper, there are several crucial steps involved. These include the thorough editorial review by the journal office, evaluation by associate editors, and valuable feedback from reviewers (Faisal, n.d.). Beside maintaining a high standard throughout the article, it is also crucial in ensuring quality in the title, abstract, methodology, discussion, and other relevant sections.

Table 4. Publication output of the halal-related projects listed by quartile.

Quartile	Number of articles
Q4	17
Q3	0
Q2	1
Q1	0
ESCI	6
NA	6

Q: Quartile, ESCI: Emerging Sources Science Index, NA: Not applicable

It is important to note that some researchers had to resort to publish in non-indexed publications due to cost where the indexed journal often imposed a high publication fee. In addition, there is also a limitation of indexed journals that are suitable or accept halal-related research articles rendering the researcher to publish in the non-indexed journals.

In terms of citations in the Scopus database, not all publications have been cited in the database records. The number of citations can differ widely based on several factors. It may be due the nature of subject matter, the quality of the research, how well it has been promoted, and also the period of publication after it was published. One of the publications showed the highest number among all publications although it was only published in 2019. This research, funded by the Ministry of Higher Education project was in the science and technology field which focused on halal nanoemulsion production. This research project has demonstrated a huge achievement as it managed to produce six publications in total. From these six

publications, two articles recorded a high number of citations in Scopus (112 citations and 21 citations, respectively).

3.2.3 Intellectual property

Only 26 % of the projects managed to produce intellectual property. Out of these 11 identified projects, four patents were still in the application process (at the time of data collection). One of the intellectual properties was categorized as a utility innovation, while the other six were in either the trademark or copyright category. This low number of intellectual properties produced may be due to various reasons. One of the possible reasons is that producing intellectual property is not a mandatory output required by most of the funders such as FRGS and TRGS. This means that some research projects may not have a specific priority or allocation of resources specifically for intellectual property rather the funders are focused on the production of the talent and publications output. Additionally, registration of intellectual property involves high cost and could be very time consuming. This may discourage researchers from pursuing it. However, this output holds valuable assets for researchers as it not only protects them but also provide recognition and financial benefits when commercialized. To this end, it would be beneficial for selected funders to consider covering the cost of registering intellectual properties.

3.2.4 Other outputs

In the field of research, conferences play a vital role in sharing knowledge, ideas and insights among researchers. In this study, 59 conferences were reported, both locally and internationally, as a platform for researchers to present their papers and participate in knowledge dissemination. The conferences were divided into two types, local and international. Interestingly, the frequency of conferences does not tally with the amount of grants approved for research projects. This implies research projects that received the least amount of funds were still able to participate in local and international conferences. In addition, some projects did not require much financial assistance to travel and participate in conferences outside the country, specifically for the virtual conferences, which became more common during the Covid-19 pandemic outbreak in 2020 and 2021. This allowed researchers to participate in conferences from their own homes with comfort, without the need for traveling and other associated expenses. Most of the international-level conferences were held in Malaysia, specifically in Kuala Lumpur and Putrajaya.

The choice of the type of conference (face-to-face, virtual, or hybrid mode) lies on the interest and preference of the researcher. The virtual conference is said to be more effective than the face-to-face mode in all criteria assessed in a study by (Hofstädter-Thalmann *et al*., 2022) as it attracts more participants from all over the world geographically. Moreover, this mode of conference is said to give more benefit to the economy and environment. Economically,

the fees are less expensive for this mode, and it is said to be environmentally friendly as it will save cost for travel. A study by Palacios *et al*., (2022) described that virtual conferences benefits the attendees by making the conference materials available for a period of time that allows them to revisit or watch if they missed the live sessions. However, the virtual format of a conference may not suit different learning styles, although the same disadvantages exist in the face-to-face format. In addition, the face-to-face format has been described to have the advantages of effective networking beyond the academic setting where physical conferencing commonly involves social events such as luncheon, dinner or even excursions.

Next, based on the data analysed, it was found that twelve local universities and one international university engaged in collaboration in some of the projects. The majority of collaborations were observed to be between local universities in Malaysia, including Universiti Kebangsaan Malaysia (UKM), Universiti Sains Islam Malaysia (USIM), Universiti Malaysia Pahang (UMP), and Universiti Malaya (UM). In addition, collaborations with external agencies such as the Forest Research Institute Malaysia (FRIM), Malaysian Agricultural Research & Development Institute (MARDI), and Veterinary Research Institute (VRI) were also reported.

While some researchers did not require collaboration with external agencies or universities, several research projects necessitated the expertise of external experts. It was also observed that researchers sometimes needed to avail facilities and resources from other places and agencies to complete their projects depending on their needs. In short, it is one of added elements and advantages for the research that establish collaborations in their studies. The findings achieved with cooperation and partnerships can facilitate in attaining the research objectives. Hence, it is important to encourage the researchers to collaborate between them and other parties or agencies to enhance the quality of the study especially the research output. By doing so, researchers can support the experts from external sources and utilize the resources to improve their research projects' quality and impact. Delgadillo (2016) mentioned that collaboration in research has been more successful when the research is funded, as it allows for a well-defined study plan with designated responsibilities.

In the evaluation of 41 projects, seven projects were observed to receive awards for their exceptional work. This means that only 17% of the projects (seven projects) were recognized for their outstanding work. Out of these seven projects, 57% received awards at the international level which portrays that they managed to produce achievements and were qualified to achieve recognition on a global scale. These projects have proven that they not only had the potential to make a significant impact locally but also at the international level. On the other hand, the remaining 42% of the seven projects were awarded locally, which remains as a remarkable achievement for their works. Besides, it also indicates that their work was also recognized in the local level in the community. It has been noticed that the recipients

of the awards were more likely to have produced intellectual property, particularly in the SnT field. This means that the projects that were given the awards were not just innovative but also had the potential to contribute to advancements in science, technology, and innovation.

No policy papers were produced by the 41 projects analysed. This could be due to several reasons such as the lack of urgency or relevance of the research topics to the creation of new policies. Furthermore, policy making is a complex, ongoing process that spans long periods and involves multiple interests and participants. Besides, it may differ over time (Serban, 2015). Hence, the creation of new policies is a time-consuming process that requires careful consideration and input from various stakeholders. Miles (2012) stated that the policy processes have their cycles and stages based on Knill & Tosun (2008). The process begins with agenda setting, followed by policy formulation, policy adoption, and implementation, and ends with an evaluation process. Given the challenges involved in creating a new policy, it is not surprising that no output exists in the policy paper category of this study.

3.3. Correlation

Spearman correlation was used to analyse the collected data to see if there was any correlation between the total grant (RM) and the total publications. As shown in Table 5, no significant correlation was found between the total grant (RM) and the total publications of the project, indicating that the amount of money received by the projects does not necessarily affect the publication output produced by the researchers.

Table 5. Spearman's rank correlation coefficient analysis conducted between total grant (RM) and total publications.

			Total Grant (RM)	Total Publications
Spearman's ρ	Total Grant (RM)	Correlation Coefficient	1.000	-0.061
		Sig. (2-tailed)	0.000	0.705
		N	41	41
	Total Publications	Correlation Coefficient	-0.061	1.000
		Sig. (2-tailed)	0.705	0.000
		N	41	41

Initially, it was expected that the amount of money received by the projects might affect the output produced by the researchers in their projects. However, following data analysis, it was found that that some projects that received a smaller amount of money managed to produce a larger number of publications compared to others that received a higher amount of total grant (RM). This demonstrates that the correlation between the total grant (RM) and the output produced by the researchers for their projects is not always linear, and it may be caused by other contributing factors that may play a role in determining the output produced.

One of the reasons is related to productivity of individual researcher where the level or productivity may differ from one another. Some researchers may have slow progress in handling their current study, while some may complete their projects within the given timeframe. Hence, the output that is produced from the projects is not solely reliant on the total grant (RM), but it might also be influenced by the individual's productivity which may be affected by age and time management in actively producing the best output for their study. This is in agreement with a study done by Fursov *et al*., (2016) in Russia which found that older academics demonstrate a higher level of publication activity as they are more productive and publish one or two articles more than younger academicians. In addition, a study done by Vuong *et al*., (2017) among Vietnamese researchers also observed that the older age of researchers is correlated with more scientific output whereas those with 15 to 25 years of experience have managed to publish the largest numbers of papers. Besides the age factor, the time allocated for research activity also influences the level of productivity in publications as professors who spend more time teaching or engaging in management activity demonstrate lower research results (Armijos Valdivieso *et al*., 2022).

The time when the research is conducted is also a crucial factor to consider. This factor became even more prominent during the Covid-19 pandemic. Some of the researchers might have faced constraints in achieving the target output during this time. Limitations of communications and interactions between researchers in a team including the research assistant, and participation in conferences may have affected the output of research regardless the quantum of funding.

4. Discussion

Research and development bring benefits to humanity. This process enables individuals to observe and broaden their understanding in any discipline of knowledge. Research commonly requires financial aid in to cover the expenses for equipment, facilities, materials and human resources, among others. This then allows a smooth progress of a particular study toward achieving the objectives.

While research is commonly being categorized into SnT versus non-SnT as in the case of this work, it is interesting to note that the halal-related studies may likely be conducted using multidisciplinary approach. The multidisciplinary approach refers to study of a research topic that incorporates perspectives from different disciplines that enrich the overall understanding towards providing solutions to the research question. While multidisciplinary approach goes beyond disciplinary boundaries, its goal remains within the framework of disciplinary research (Nicolescu, 2014).

For instance, in relation to halal-related research, the work may have both the elements of pure sciences and social science with a reference to religious studies (*shari'ah*) as well.

Another example can be seen in halal pharmaceutical research where a combination of fields is important whereby chemistry is required to ensure purity of substances, biotechnology to create alternatives for non-halal components), and Islamic jurisprudence to align with *shari'ah* principles.

The concept of the halal area is deeply rooted from the Quran. Even for researchers focusing on the SnT field, it is highly advantageous for them to incorporate *shari'ah* perspective in their work. In addition, when writing an academic paper, it is not merely about conveying information, but it also serves as a platform to cultivate awareness about halal practices from an Islamic standpoint. It is crucial to acknowledge that the halal field is important, and its significance extends beyond worldly affairs and holds relevance for the afterlife.

This study has some limitations of which it only covers halal-related research projects collected based on the specific keyword 'halal' appearing in the title, hence narrowing the sample obtained. Halal areas encompass a broad scope. Some of the titles may not actually contain the 'word' halal itself but the study could well be in the scope of halal. For instance, a study discussing on halal aspects such as the topic related to the concept of *al-Jallalah* (animals of which are fed with *najs* and others similar to it, like excrements and filthy things) may not have the word 'halal' in the title. Hence, further research is suggested to expand beyond using the specific keyword in a research project title and open the discussion on the wider topics in Islamic studies.

5. Conclusions

The funding trends and outputs analysed in this work provide insights into halal research and development priority areas. The findings will benefit numerous stakeholders, allowing relevant entities to set priorities effectively and future-proof the halal industry through strategic funding and policy development. Overall, it can be concluded that halal-related research in IIUM is progressing with considerable outputs observed. The current work can be replicated in other halal-related research institutions/centres or even at national level to fully understand the funding trends and its interrelationship with the output. As the halal industry continues to grow, a strong R&D should be in place to support and provide effective solutions, products and services required.

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