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# Finding Important Patterns of *Sadaqah* and *Waqf* Transactions in the Eid Charity Global Donation using Frequent Pattern Growth

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*Abstract*— This study aims to explore and uncover hidden patterns in charitable donation transactions (*sadaqah* and *waqf*) using the Frequent Pattern Growth (FP-Growth) algorithm as a method of association rule mining. The research employs an experimental design conducted on the Google Colaboratory platform using Python version 3.11.3. The dataset used is the global donation data from Eid Charity, available on the Kaggle platform, comprising 45,842 rows and 33 attributes. The experimental results yielded six association patterns, all of which have the consequence of "mosques," indicating that various forms of donations consistently culminate in fund allocations to mosques. The most significant pattern was found in the combination of “Ensuring preachers and imams are conditional” and “Well Drilling,” which produced the highest metric values in confidence (0.896), lift (3.39), conviction (7.08), and Zhang’s metric (0.714). These findings suggest that mosques serve as the central hub of philanthropic activity within the dataset. The discovered patterns provide deep insights into donor behavior tendencies and can serve as a foundation for more targeted and effective strategies in managing and developing future donation programs.

***Keywords- Association Rule Mining, Data Science, FP-Growth, Sadaqah, Waqf***

## I. INTRODUCTION

In today's digital era, the advancement of information technology has made significant contributions to various aspects of human life, including the field of Islamic philanthropy, such as *sadaqah* and *waqf*. These two instruments play a crucial role in poverty alleviation and sustainable development within Muslim societies [1]. Beyond their spiritual dimensions, *sadaqah* and *waqf* also have broad socio-economic impacts, especially when managed effectively and driven by data. With the growing prevalence of digital donations, the resulting transaction data has become increasingly large and complex, necessitating the use of advanced analytical methods to extract meaningful insights [2].

Big data in the context of charitable transactions, particularly from international philanthropic institutions such as Eid Charity, contains various critical information, including donation types, amounts, time, location, and donor preferences [3]. This data holds immense potential for analysis, enabling the discovery of hidden patterns that can support more targeted decision-making, such as designing charitable programs aligned with donor trends and preferences. In this regard, data mining techniques become highly relevant. Data mining is the process of identifying useful patterns or information from large datasets, and one of its most popular methods is association rule mining.

Association rule mining allows researchers to uncover relationships among items in transaction datasets. Although widely known for its application in market basket analysis, this technique is not limited to commercial sectors. In the context of *sadaqah* and *waqf*, it can be used to understand donor behavior tendencies, such as the types of donations frequently given together, the most active months for charitable giving, and specific combinations of donation purposes. This information can help charitable fund management institutions craft more effective and efficient campaign strategies. One of the most efficient algorithms for implementing association rule mining is the Frequent Pattern Growth (FP-Growth) algorithm. FP-Growth is considered more efficient than the Apriori algorithm because it does not require the time- and resource-intensive generation of candidate itemsets. Instead, it constructs a tree-based data structure called the FP-tree to represent frequent patterns in a compact and systematic manner. This advantage makes FP-Growth particularly suitable for analyzing large datasets like that of Eid Charity, which records thousands to millions of transactions from various countries [4].

The Eid Charity Global Donation dataset comprises transaction records of *waqf* and *sadaqah* from an international institution actively distributing Islamic philanthropic funds across multiple countries [5]. It includes rich dimensions such as transaction time, donation types (*sadaqah*, *waqf*, fidyah, etc.), donation purposes (mosque construction, clean water provision, education, etc.), as well as donation amounts and payment methods. Unfortunately, to date, very few studies have specifically explored this dataset to identify associative patterns between donation types and purposes using association rule mining approaches. Therefore, this study seeks to fill that gap.

## II. RELATED WORKS

### A. *Association Rule Mining in Transaction Pattern Analysis*

Association rule mining is a crucial technique in data mining, used to identify associative patterns between items within a transactional dataset. This method generates implication-based rules that express relationships among items or events that frequently occur together. Initially applied in the retail sector particularly in market basket analysis to detect items often purchased together it has since expanded across numerous analytical fields due to technological advancement. In the development of management information systems, association rule mining assists in designing marketing strategies, managing inventory, and enabling data-driven decision-making. For example, product association patterns can guide managers in creating promotional bundles or strategically placing items in store displays. Generally, association rule mining provides a foundation for more personalized and efficient recommendation systems [4].

The process of association rule mining includes several key stages: data cleaning, identification of frequent itemsets, and rule generation based on minimum support and confidence thresholds. The support value indicates how frequently an itemset appears in the dataset, while the confidence value reflects the likelihood of item Y appearing in transactions that contain item X [6]. The application of this technique is not limited to economics and business. In education, it has been used to analyze student learning behavior, relationships between subjects, and decision-making in e-learning systems. In healthcare, it is applied to uncover links between symptoms, diagnoses, and treatments to improve medical services.

The strength of association rule mining lies in its ability to extract hidden insights from large datasets, insights that are often undetectable through conventional statistical techniques. As a descriptive and exploratory method, it is well-suited to identifying indirect or non-obvious relationships in data, adding substantial value to evidence-based decision-making.

In the realm of information technology, association rule mining is frequently integrated with machine learning and artificial intelligence to build more adaptive predictive systems. When applied to intelligent systems, this technique can generate highly accurate recommendations grounded in historical user behavior. Such systems have applications ranging from e-commerce to public service platforms [7].

Despite its advantages, the technique also faces challenges, particularly in computation time when dealing with massive and complex datasets. Consequently, researchers have developed various optimized versions of basic association rule algorithms to enhance efficiency and scalability. One of the most significant advancements in this area is the development of the FP-Growth algorithm as an alternative to Apriori [8]. Another important aspect of association rule mining is the interpretability of the derived rules. Not all discovered associations are meaningful or relevant in a business or social context. Therefore, it is crucial to implement validation and filtering processes to retain only impactful and actionable rules. This may involve the use of additional metrics or deeper contextual analysis [9].

In community-based or social projects, association rule mining can be utilized to analyze behavioral tendencies or preferences of individuals or groups. These include donation behaviors, participation in social events, choice of aid categories, or patterns in the consumption of public services. This technique is capable of uncovering relationships that are not immediately apparent.

In the public service and nonprofit sectors, association rule mining is increasingly being recognized as a tool for identifying public response patterns to social programs. For example, fundraising or aid distribution data can be analyzed to examine links between types of assistance and the timing of distributions. These findings can inform more data-driven and effective social program planning. Overall, association rule mining offers substantial potential for making better-informed, data-driven decisions. Its capacity to uncover hidden patterns and its alignment with user or community behavior make it a highly relevant technique, particularly in

managing charitable donation transactions and philanthropic activities.

### B. *Implementation of the FP-Growth Algorithm in Frequent Pattern Mining*

FP-Growth is an algorithm specifically designed to enhance the efficiency of mining frequent itemsets, serving as an alternative to the Apriori algorithm. Unlike Apriori, which generates candidate itemsets explicitly and scans the dataset multiple times, FP-Growth constructs a tree-based data structure known as the FP-tree. This structure allows for faster and more memory-efficient analysis[10]. The FP-tree stores essential information about the frequency of itemsets in a structured and compact manner. The process begins with an initial scan of the dataset to determine the frequency of individual items, followed by sorting these items in descending order and inserting them into the tree. This approach eliminates the need for exhaustive candidate generation, significantly reducing processing time.

The primary advantage of FP-Growth lies in its high performance and scalability. In large datasets containing hundreds of thousands of transactions, it outperforms Apriori by producing results more rapidly. This makes FP-Growth the preferred choice for big data and real-time data applications.

Additionally, FP-Growth minimizes the need for repeated dataset scans. Typically, it requires only two full scans: one to calculate item frequencies and another to construct the FP-tree. This is especially beneficial when working with massive datasets where repeated disk or memory access is computationally expensive.

FP-Growth has been applied across various domains, including banking, web analytics, content recommendation, and customer service. In education, it is used to evaluate relationships between subjects and student performance. In retail, it helps determine product bundling strategies based on consumer shopping patterns. In academic research, FP-Growth is often employed to explore complex transactional datasets. Several studies have proposed extensions and adaptations of the algorithm, such as H-Mine and TreeProjection, to accommodate larger and more diverse datasets [11].

The algorithm also lends itself well to visualization techniques that enhance the interpretability of derived rules. For instance, frequent patterns can be visualized as graphs or diagrams that clearly depict item relationships, aiding policymakers in understanding the analysis outcomes.

In practical applications, FP-Growth is commonly integrated with modern data mining libraries or frameworks such as Apache Spark, WEKA, and Python's MLlib. These integrations facilitate seamless inclusion in existing data pipelines and enable automation of the analysis process. Such advantages make FP-Growth highly relevant in intelligent and AI-based systems.

Nonetheless, FP-Growth is not without limitations, especially in cases involving sparse datasets or high-dimensional itemsets. Under such conditions, the FP-tree may become excessively complex and difficult to manage. Therefore, choosing an appropriate minimum support threshold is essential to maintain performance and produce meaningful results.

To further enhance effectiveness, many studies recommend combining FP-Growth with preprocessing techniques such as clustering, dimensionality reduction, or filtering. These steps help reduce data complexity prior to FP-tree construction and improve the quality of resulting association rules.

In this study, FP-Growth is selected due to its strength in identifying frequent donation patterns within the Eid Charity dataset, which comprises thousands of transactions. Given the dataset's large and complex nature, FP-Growth is considered an appropriate solution for extracting valuable, previously hidden insights. These patterns will serve as a foundation for developing more effective donation distribution and promotion strategies.

In summary, FP-Growth is a highly relevant and effective algorithm for philanthropic donation analysis. Its ability to efficiently handle large datasets and generate frequent itemsets swiftly adds significant value to the development of data-driven analysis systems.

### C. *Application of Data Mining in Islamic Philanthropy: Sadaqah and Waqf*

The application of data mining in Islamic philanthropy, particularly in managing *sadaqah* and *waqf* transactions, represents a groundbreaking effort to leverage information technology for the empowerment of the Muslim community. Historically, the collection and distribution of charitable funds have often been managed manually or through basic administrative information systems. However, with the increasing volume of digital transaction data, especially from online donation platforms, there is a growing opportunity to extract valuable insights through more advanced data analytics approaches [12].

Data mining enables zakat, *sadaqah*, and *waqf* institutions to gain a deeper understanding of donor behavior and preferences. By uncovering these patterns, organizations can develop more targeted campaign strategies, choose optimal fundraising times, and determine which programs align best with community needs. This approach not only enhances the effectiveness of fund distribution but also builds donor trust by demonstrating professionalism and data-driven practices.

One of the most relevant data mining techniques for this context is association rule mining, particularly using the FP-Growth algorithm. This approach allows identification of patterns involving donation types, timing, payment methods, and donation purposes. For example, analysis may reveal that donors who contribute to educational *waqf* during Ramadan are also likely to give *sadaqah* to clean water programs in the same month. Such patterns would be difficult to detect without data mining.

In the context of *waqf*, which tends to be long-term and productive in nature, data mining can help managing institutions prioritize development projects and ensure

program sustainability [12]. By analyzing historical data, organizations can forecast donation potential, identify community preference trends, and evaluate the feasibility of productive programs such as agricultural *waqf*, educational *waqf*, or healthcare *waqf*. These patterns can also support long-term social investment planning.

Meanwhile, *sadaqah*, which is more flexible and often responsive to emergencies, can benefit from data mining to anticipate donation surges, especially during peak periods like Ramadan, Fridays, or natural disasters. Accordingly, institutions can prepare their distribution systems, logistics, and reporting in a more predictive and proactive manner.

Several zakat and philanthropic institutions around the world have begun adopting big data and data analytics to enhance their management systems. However, most of these efforts are still limited to dashboards and data visualization; few have adopted mining techniques to systematically uncover hidden patterns. Therefore, the approach used in this study is vital in expanding the practical application of data mining in religious sectors.

Properly managed donation transaction data can also serve as a foundation for building recommendation systems. By using mined donor preference patterns, institutions can suggest donation types or programs that are relevant to individual donors. Such systems, commonly used in commercial platforms like e-commerce, hold significant potential for increasing donor engagement in philanthropy [9].

Moreover, data mining can facilitate donor segmentation, grouping donors based on their characteristics and donation habits. This segmentation is invaluable for personalizing communication approaches, including the type of donation message sent, the optimal timing for engagement, and the nature of programs offered. All these efforts aim to improve communication efficiency and donation conversion.

In the context of global Islamic philanthropy, as seen with Eid Charity, data mining can play a major role in mapping social needs based on geographic regions. Donation patterns from certain countries may reflect specific needs. For instance, African countries may receive more donations for clean water, while South Asian countries may focus on education. These patterns, if further analyzed, could inform the structuring of global program priorities.

The use of data mining in philanthropy also opens opportunities for evaluating program effectiveness. By correlating donation data with program impact over time, institutions can identify which programs are most sustainable, most popular, or show increasing contributions year by year. This supports the principles of good governance and transparency in managing community funds.

Integrating technology with Islamic values can also be enhanced through this approach. Data mining is not merely a technical tool but part of a contemporary *ijtihad* in professionally managing community trusts. Philanthropic organizations no longer rely solely on intuition but base decisions on objective and accurate data for outcomes that serve the common good [13].

Overall, the application of data mining in managing *sadaqah* and *waqf* represents a promising new approach to improve the effectiveness, efficiency, and transparency of Islamic philanthropic institutions. This study seeks to position the FP-Growth technique within this context by exploring the Eid Charity dataset as a case study. It is hoped that this research will contribute both theoretically and practically to the development of data-driven Islamic philanthropy systems in the digital age.

## III. RESEARCH METHODS

This study employs a quantitative method with an experimental approach to explore patterns in charitable donation data. The research was conducted using Google Colaboratory (Google Colab) with the Python programming language, version 3.11.3. Google Colab was chosen for its accessibility, free cloud-based computing resources, and support for various essential data mining libraries [11].

The dataset utilized in this study was sourced from Kaggle, titled *"Eid Charity Global Donation Data"* by Davin Hundeyin, consisting of 33 columns and 45,842 rows. The research process began with loading the dataset using the Pandas library. Then, exploratory data analysis (EDA) was performed using Matplotlib and Seaborn to visualize data distributions and understand the characteristics of numerical columns.

Following EDA, data preprocessing was carried out. This included imputing missing values or removing incomplete entries, depending on their relevance to the analysis, and eliminating irrelevant attributes such as transaction IDs or columns with constant values, which do not contribute meaningful information to pattern mining. Non-informative characters, symbols, and textual artifacts were also removed to ensure data consistency. These steps were executed using the mlxtend library [14].

The dataset was then transformed into a transactional format, representing each donor and the list of charitable activities they performed. This structure is essential for association rule mining, as algorithms like FP-Growth operate based on item collections within a transaction. In this study, each donor is treated as a transaction, and the items in that transaction represent the types of charitable acts (e.g., educational *sadaqah*, clean water *waqf*) performed by the donor.

To prepare the data for FP-Growth, TransactionEncoder from the mlxtend library was employed. This encoder converts the list of transactions into a binary matrix, where each row represents a transaction and each column indicates the presence (True/False) of a specific item. This matrix then serves as the input for the frequent itemset mining process [15].

The pattern mining process was conducted using the FP-Growth algorithm, also available within the mlxtend library. FP-Growth was chosen for its efficiency in discovering frequent itemsets without generating all possible candidate combinations as required by Apriori. The parameters applied

in this study included a minimum support threshold of 0.005, meaning that only itemsets appearing in at least 0.5% of total transactions were considered. For association rule generation, the minimum confidence threshold was set at 0.7, and the minimum lift value at 3. Rules that passed these filters were regarded as strong and statistically significant.

The output of this mining process was a set of associative patterns in the form of implication rules, such as {clean water *sadaqah*} → {educational *waqf*}, indicating that donors who contributed to clean water programs also tended to donate to educational *waqf* initiatives. These patterns were then analyzed descriptively to identify behavioral trends among donors in Islamic philanthropy [16]. The results were evaluated based on standard association metrics: support, confidence, and lift. Support reflects the frequency of itemset occurrence in the dataset, confidence indicates the strength of the association between items, and lift measures the increase in the probability of item Y given the presence of item X. Patterns with high confidence and lift values greater than 1 are considered strong and meaningful [17].

Through this methodological approach, the study aims to produce valuable insights for Islamic philanthropic institutions in developing more targeted donation distribution and campaign strategies. By understanding the relationships between donation types and objectives, organizations can improve their program planning in alignment with donor preferences. This approach also reinforces the importance of modern analytics in the management of Sharia-based social funds [18].

Overall, the methodology used in this study reflects a practical application of data mining techniques in a religious and socially impactful context. It demonstrates how algorithms such as FP-Growth can be utilized to address the challenges of donation data management in the digital era.

## IV. RESULT AND DISCUSSION

From the results of the study conducted using FP-Growth, 6 patterns were found from the entire dataset. Figure 1 is a bar chart to show a comparison of the magnitude of the metrics based on the list of patterns found.

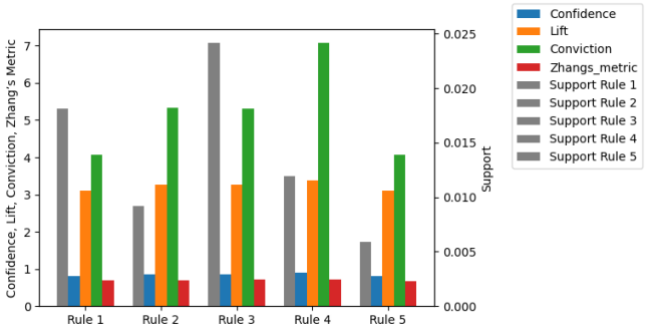


Fig. 1. Comparison of Rule Support

Based on the data presented in the table above, the pattern with the highest metric values is pattern number 4, with a support value of 0.0119, confidence of 0.896, lift of 3.39, conviction of 7.08, and Zhang's metric of 0.714.

On the other hand, patterns 2 and 3 share the same values for confidence (0.861) and lift (3.26), but differ in other metrics. Pattern number 2 has a support value of 0.009, a conviction of 5.32, and Zhang's metric of 0.700; whereas pattern number 3 shows a support value of 0.024, a conviction of 5.29, and Zhang's metric of 0.713.

Pattern number 1 records a support value of 0.018, confidence of 0.82, lift of 3.10, conviction of 4.07, and Zhang's metric of 0.692. Meanwhile, pattern number 5 has a support value of 0.0056, a confidence of 0.82, a lift of 3.10, a conviction of 4.07, and Zhang's metric of 0.682.

Table 1. Detail Patterns

| Antecedents | Consequence | Support | Confidence | Lift | Conviction | Zhang's metric |
|---|---|---|---|---|---|---|
| Expenses of printing copies of Qur'ans are conditional mosques | Mosques | 0.018 | 0.82 | 3.10 | 4.07 | 0.692 |
| Expenses of printing copies of Qur'ans are conditional mosques , Well drilling | Mosques | 0.009 | 0.861 | 3.26 | 5.32 | 0.700 |
| Ensuring preachers and imams is conditional | Mosques | 0.024 | 0.861 | 3.26 | 5.29 | 0.713 |
| Ensuring preachers and imams is conditional , Well Drilling | Mosques | 0.0119 | 0.896 | 3.39 | 7.08 | 0.714 |
| Iftar fasting outside Qatar is conditional mosques 1436 | Mosques | 0.0056 | 0.82 | 3.10 | 4.07 | 0.682 |
| Call unspecified year | Mosques | 0.0075 | 0.813 | 3.07 | 3.93 | 0.681 |

Pattern number six shows a support value of 0.0075, confidence of 0.813, lift of 3.07, conviction of 3.93, and Zhang's metric of 0.681. The average support across all patterns is 0.012807, with the highest support being 0.024 and the lowest at 0.0056. The average lift across all patterns is 3.198592, where the highest lift value of 3.39 is found in pattern number 4, and the lowest, 3.07, in pattern number 6. On the other hand, the average conviction is 4.793333, with pattern number 4 again having the highest value at 7.08, and the lowest, 3.93, in pattern number 6. The average Zhang's metric is 0.697560, with the highest score of 0.714 in pattern number 4, and the lowest, 0.681, in pattern number 6.

Based on the antecedents and consequences listed in the table, all patterns share the same consequence, which is

mosques. This indicates that all antecedents, representing various forms of donation activities, consistently lead to mosque-related funding as a consequence.

Patterns 1, 2, 3, and 4 share similar antecedents. For example, pattern 1 and pattern 2 both include the antecedent "Expenses of printing copies of Qur'ans are conditional mosques." Similarly, the antecedent Well Drilling appears in both patterns 2 and 4, and the antecedent Ensuring preachers and imams is conditional and appears in both patterns 3 and 4. This suggests a synergy between patterns 1 and 2, as well as patterns 2 and 3, converging toward pattern 4.

In contrast, patterns 5 and 6 do not share antecedents with any other patterns, marking them as unique. The discovered patterns provide deep insight into donor behavior when allocating their *waqf* and *sadaqah*. Pattern number 4 stands out as the most significant across all five evaluation metrics: support, confidence, lift, conviction, and Zhang's metric. The support value of 0.0119 indicates that the combination of antecedents "Ensuring preachers and imams are conditional" and "Well Drilling" appears in 1.19% of all transactions in the dataset. Although this may seem like a small proportion, the very high confidence (0.896) and lift (3.39) values confirm that when these antecedents appear, the likelihood of donations being directed toward mosques is very high. The conviction value of 7.08 is the highest among all patterns, further underscoring the strength of the implication. The Zhang's metric of 0.714 also signals a strong and positive association [19].

Among the six patterns, there is a strong tendency for religious-social activities such as distributing Qur'ans, drilling wells, and supporting religious personnel (imams and preachers) to be closely tied to mosque development and management. Patterns 3 and 4 are particularly similar, with "Ensuring preachers and imams are conditional" emerging as a key antecedent. This reflects a consistent prioritization of mosque-based religious education funding.

Patterns 1 and 2 share the antecedent "Expenses of printing copies of Qur'ans are conditional mosques," highlighting that initiatives for Qur'an distribution are both common and often directed at strengthening worship facilities. Although pattern 1 has a higher support value (0.018) than pattern 2 (0.009), its confidence and lift are lower. This implies that while pattern 1 occurs more frequently, its logical relationship between antecedent and consequence is not as strong as pattern 2. This distinction teaches us that the frequency of occurrence (support) does not always equate to logical strength (confidence and lift).

Patterns 5 and 6 are unique as their antecedents do not overlap with others. Pattern 5 ("Iftar fasting outside Qatar is conditional mosques 1436") and pattern 6 ("Call unspecified year") represent more temporally or event-specific donations. Despite having the lowest support values (0.0056 and 0.0075, respectively), their confidence remains above 0.8 and lift above 3, indicating that although rare, these patterns still strongly lead to mosque-related consequences. These patterns reflect donation contexts that are temporal or campaign-based, such as Ramadan-specific initiatives [20].

The average metric values across all patterns reveal that while support values are relatively low (0.012807), both confidence and lift are notably high. This reinforces the idea that even infrequent patterns can have strong predictive power. This finding supports the validity of using FP-Growth in donation transaction analysis, as the extracted patterns are not solely based on frequency but also on the strength of logical associations between transaction items.

An analysis of conviction adds further insight. The highest conviction value (7.08) in pattern 4 confirms it has the strongest predictive reliability for the consequence "mosques" when its antecedents are present. Conviction is useful for evaluating how much the consequence depends on the antecedent, indicating that in pattern 4, the antecedent and consequence are highly interdependent [21].

Zhang's metric serves as another key indicator of association strength and direction. The average Zhang's metric of 0.697560 shows that almost all patterns exhibit a strong positive association, with the highest score (0.714) again belonging to pattern 4. Notably, Zhang's metric is designed to address weaknesses in conventional metrics when dealing with imbalanced data, making it particularly suitable for donation datasets where transaction distributions are often uneven.

The uniformity of the consequence ("mosques") across all patterns is a compelling finding. It reveals that all forms of donations, whether spiritual (like Qur'an distribution or imam support) or physical (such as well drilling or iftar provisioning), are consistently linked to mosque development or function enhancement. In this dataset, mosques emerge as the central hub of philanthropic activities. This suggests that in certain cultural and social contexts, mosques are not merely places of worship but also serve as centers for community welfare distribution, education, and religious-social engagement.

The findings of this study offer valuable insights for religious institutions engaged in managing and promoting philanthropic activities such as *shadaqah* and *waqf*. By uncovering patterns in donation behavior, the FP-Growth algorithm enables institutions to better understand donor priorities and behavior. This data-driven awareness can inform the strategic planning of donation campaigns, allowing religious organizations to tailor their appeals based on empirically observed preferences. For example, the frequent association between Qur'an printing, iftar packages, and mosque donations suggests a strong communal and ritualistic orientation among donors, which religious institutions can leverage in Ramadan campaigns or mosque development programs.

Moreover, the application of association rule mining in a religious context encourages a shift toward evidence-based decision-making within faith-based charitable organizations [22][23][24][25]. Traditionally driven by intuition or clerical insight, the management of *zakah*, *sadaqah*, and *waqf* can now be enhanced through analytical models that reveal latent donor behavior and trends. This methodological transformation can promote transparency, improve fund

allocation, and even support the development of digital Islamic philanthropy platforms that adapt in real time to donor inclinations. In doing so, religious practices of giving are not only preserved but also modernized, strengthening institutional trust, enhancing religious engagement, and ultimately aligning spiritual values with technological innovation.

## V. CONCLUSION

The majority of charitable activities found in the dataset focus on religious aspects, as indicated by the patterns that lead to donations directed toward mosques. This is evidenced by donation transactions such as funding for Qur'an printing accommodations, well drilling, support for mosque imams and preachers, organizing iftar events, and others. Patterns 1, 2, 3, and 4 exhibit synergy, as shown by several shared antecedents. On the other hand, patterns 5 and 6 are unique and independent, with no overlapping antecedents.

This study successfully implemented the FP-Growth algorithm to uncover associative patterns within *sadaqah* and *waqf* transaction data derived from the Eid Charity Global Donation dataset. The analysis resulted in six relevant association patterns, all of which led to a single primary consequence: "mosques". This finding highlights that, within the philanthropic practices recorded in the dataset, mosques serve as the central hub or final destination for various forms of donations, ranging from religious initiatives such as Qur'an printing to social programs like well drilling and providing meals during fasting periods. The use of the FP-Growth algorithm proved to be both effective and efficient in identifying hidden relationships between items, without the need to generate candidate itemsets, an advantage that enhances processing speed and scalability.

Among the six patterns discovered, pattern number four stands out as the strongest association, indicated by highly significant metric values: confidence (0.896), lift (3.39), conviction (7.08), and Zhang's metric (0.714). This suggests that the combination of the activities "Ensuring preachers and imams are conditional" and "Well Drilling" is a powerful predictor of donations being directed to mosques. Additionally, patterns two and three also demonstrate similarly strong association values, indicating a logical and structural connection between various types of donations. Conversely, patterns five and six, although less frequent, still exhibit strong and stable associations. This suggests the existence of opportunities for developing donation strategies that are momentum-based or seasonal in nature.

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