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Integrating Knowledge Management with Association Rule Mining for Marketing Decision Support in Creative Industries

Omar Bilal Al-Ani[1], Murtadha M. Hamad[2]
Department of Computer Science, College of Computer Science and Information Technology, University of Anbar, Iraq
1) Corresponding author: omar221415@gmail.com
2) dr.mortadha61@uoanbar.edu.iq

Abstract
Fashion, digital media, and design are some of the creative industries in business that face great challenges in making marketing decisions due to competition and the dynamics of the environment. Association Rule Mining (ARM) has proven to be very useful in discovering hidden patterns and relationships in consumer behavior data used in advertising and providing suggestions. This is because of the lack of an ability to manage, store, and share the discovered rules. This project seeks to link knowledge management (KM) and ARM to create a marketing decision model that is adaptable and sustainable. This link ensures the storage and management of the extracted rules in a single knowledge management repository, making it inevitable to keep marketing decisions current and aligned to changing consumer behavior trends. The report also reveals a critical gap in previous studies in the literature review section, indicating that although many studies have utilized ARM and deep learning to process and analyze different datasets (retail, fashion, Twitter, e-commerce, and live streaming), they have been limited in their sustainability and reusability due to the lack of knowledge management systems. This study fills this gap by linking KM and ARM to make things more accurate and adaptable in business environments characterized by constant changes.
Keywords: Knowledge Management ; Association Rule Mining ; Marketing Decision.

1. Introduction

In today's data-driven creative economy, organizations increasingly seek to combine artistic innovation with analytical intelligence to improve marketing decisions.

Creative industries such as design, media, and fashion have become increasingly reliant on digital analytics to keep pace with rapidly changing consumer tastes and fierce competition . Recent research on "creative analytics" suggests that organizations can make creative decisions based on evidence and data without losing the experimental and human nature of creative work (such as collaborative teams engaged in data analysis and iterative experimentation). (Tamm et al. 2022) [1] .

At the same time, data mining techniques particularly market basket analysis and association rule extraction, have proven highly effective in discovering purchasing patterns between products, which marketers can leverage for cross-selling, as well as diversifying offers and customizing recommendations within social media platforms [2] .

Within fashion a core branch of the creative economy comprehensive reviews document how recommendation pipelines blend content features with association-style signals to shape consumer journeys and trend discovery [3] .

Yet despite ARM's tactical impact many implementations remain "one-off" analyses: patterns are mined reported then lost to organizational memory. The knowledge created by ARM is rarely captured with metadata versioned shared across teams or systematically updated limiting strategic reuse and learning over seasons and campaigns. This gap is particularly salient in creative sectors where project-based workflows and rapid trend cycles demand robust Knowledge Management (KM) to retain and operationalize insights. Evidence from the creative-industry context underscores the role of KM infrastructures and social capital in sustaining innovation and coordinated action (Mayasari & Chandra 2020). [4] .

This study addresses that gap by proposing and analyzing a KM-first integration with ARM for creative-industry marketing decisions. The core idea is to treat mined rules as knowledge assets stored in a rule

repository with provenance governed and shared via dashboards/APIs and periodically refreshed through feedback-driven re-mining so creative teams can couple human ideation with continually updated organization-wide market knowledge. [5]
This study proposes a framework for integrating knowledge management and association rule extraction techniques to enhance sustainable marketing knowledge and decision-making within the creative industries.

2. BACKGROUND

In this context, the study links association rule mining with knowledge management for marketing decision-making in the creative industries. As consumer preferences rapidly evolve, association rule mining techniques play a pivotal and crucial role in transforming raw data into knowledge assets [6] . However, this extracted knowledge often remains temporary or isolated, as it is not systematically stored, shared, or updated within a knowledge management framework a gap particularly prominent in the creative sectors, with their short-term, project-based workflows. Therefore, this study emphasizes the need for an integrated framework that aligns knowledge extraction with its life cycle, ensuring that marketing decisions are more accurate, sustainable, and knowledge-driven .

2.1 Data-Driven Marketing in Creative Industries

Today, organizations rely on data to manage their creative marketing strategies. Once upon a time, intuition was the standard for making marketing decisions . [1] Tam et al. (2022) point out that decisions in the past were driven by intuition, but now they are driven by evidence. Companies are now combining the two.
After companies leverage customer data and market analytics, they design their content and campaigns to suit customer tastes. Kovalchuk et al. (2024) point out that market analysis improves companies' decision-making and also increases their profitability [7] .
In summary, data-driven marketing is of great importance in the creative industries. This helps maintain competitiveness among companies, increases understanding of customer behavior, and leverages other creative content strategies in campaigns.

2.2 Knowledge Management in Strategic Decision-Making

Knowledge management is a systematic process that initially collects, organizes, and then shares knowledge. Knowledge management plays an important role in marketing and strategic decision making. [8]
Umezurike et al. (2025) [9] describe knowledge management as a tool that enhances strategic decisions through a company's collective expertise and capital.
Knowledge management provides important information, such as the benefits of past projects and customer insights, and makes it systematically available to decision-makers. Improved decisions result from integrating knowledge management into current, cutting-edge research.
Companies that integrate knowledge management into their products can quickly adapt to this volatile marketing environment because they leverage up-to-date knowledge. In short, knowledge management enhances marketing decisions by providing customers with the right knowledge at the right time, ensuring improved marketing decisions.

2.3 Association Rule Mining for Consumer Behavior Analysis

Association rule mining (ARM) is a data mining technique widely used to analyze consumer behavior patterns. Also known as market basket analysis ARM automatically discovers frequent co-occurring relationships among items or events in large datasets of transactions . This method is well known for its ability to uncover hidden patterns in customer purchase data – for instance identifying which products are often bought together or sequences of items commonly purchased by a certain segment [10] .Such patterns reveal consumer buying habits that are not immediately obvious providing marketers with insights into customer preferences. These insights can be extremely valuable for decision-making. Information derived from association rules can be used to generate data-driven recommendations for marketing strategy . For example retailers have applied ARM results to optimize store layouts (placing complementary products closer) design effective cross-selling and upselling promotions and personalize recommendations in both e-commerce and brick-and-mortar settings . By analyzing consumer behavior through ARM creative industry marketers (in fashion music digital content etc.) can similarly identify trend associations – such as which genres or styles tend to be consumed together – and use this knowledge to tailor their offerings and marketing campaigns to better satisfy customer needs .

2.4 Integrating Knowledge Management and Association Rules

Many association rule mining techniques are implemented in isolation. This means that association rules are extracted, used only once, and then lost because there is no knowledge repository to store them with metadata (support, trust, leverage, history). Consequently, the extracted knowledge becomes temporary and non-reusable, meaning it can only be used once. Recent studies have shown that integrating both mining techniques into a knowledge management system is insufficient. This leads to the loss of the value of the extracted knowledge after analysis [11] .

From another perspective, mining tools, including association rule extraction techniques, were isolated from decision support systems (DSS) and KM processes, where the results remained static and were not routinely updated daily. Therefore, early work suggested linking knowledge management and DSS to transform knowledge outputs into operational knowledge [12]

On the other hand, marketing knowledge remains dispersed across departments due to the absence of a knowledge repository that links knowledge management and association rule extraction techniques. This absence limits the ability to store, analyze, and share knowledge within the organization. This leads to duplication of effort and the loss of expertise over time. [13]

The bottom line here is that association rule extraction techniques are not the problem per se, but rather that the results extracted from these techniques do not enter the knowledge lifecycle that preserves, shares, and updates them. Therefore, integration with knowledge management becomes necessary so that the rules are transformed from a report result into a reusable knowledge asset .

Here, integration transforms the results of mining, such as rules extracted from correlation techniques, into reusable knowledge within the knowledge management framework. This means that the extracted rules are not merely temporary results but are incorporated into the knowledge lifecycle to be stored, shared, and continuously updated within the organization.

There are several steps to integrating knowledge management with association rule extraction techniques. Initially, extraction algorithms are used to extract rules in the first step, specifically Priority and FP-Growth, to identify related patterns and relationships between products, such as "whoever buys cheese also buys tea." This stage produces "primary knowledge," but it is still unstructured and not yet ready for institutional use [14] .Following this, the organization and storage process takes place, where the rules generated by the correlation algorithms are converted into knowledge records within a knowledge repository. These records are then associated with descriptive data such as support, confidence, and lift values . Also, the extraction date, data type, and targeted campaign are included. Finally, the rules are indexed by market segment to facilitate user access. [15] .

This knowledge, extracted through Decision Support Systems (DSS) and dashboards, is then shared and utilized by the marketing team. They can analyze it and apply it to various strategies such as cross-selling, product recommendations, and the design of smart marketing campaigns. In this way, the results of linking rules are transformed into knowledge assets [16] .

3. Research Gap in KM–ARM Application for Creative Marketing

In the following study by Yang & Ko (2022), IJPRAI, this study proposes a recommendation system for handicrafts with an improved algorithm, but at the same time it lacks the integration of both knowledge management and the extraction of correlation rules, as their absence leads to a deterioration in performance with changing consumer tastes due to the lack of periodic knowledge updates [17] .

In the study by Leininger et al. (2020), retail recommendation systems focused on menswear recommendation models. They developed a multi-filter system, and the model achieved 91% accuracy, consuming a significant amount of computational resources. However, this study limited performance improvements to immediate performance and did not incorporate any knowledge management mechanisms. It did not provide a framework for storing rules or reusing the extracted models. Therefore, the research gap here is the lack of knowledge management and associative rule mining within the system [18] .

This study focuses on building an interactive recommendation system in the fashion field. This system relies on user images and interactions without providing a framework for preserving, organizing, or reusing the

output. None of the knowledge lifecycle processes, such as storage, indexing, and sharing, are present. Consequently, the output remains short-lived and unintegrated into decision support systems [19] .

(According to Chakraborty et al., 2021) The review focuses on classifying fashion recommendation systems in terms of models, algorithms, and filtering techniques (visual/deep learning/social, etc.), and examines components and performance without proposing an institutional knowledge management framework that preserves, indexes, shares, and updates recommendation patterns across seasons and campaigns. It also fails to present Association Rule Mining as a knowledge asset managed within a knowledge repository and reused within a decision support system or feedback loop/re-mining. This leaves a clear gap between pattern discovery and the knowledge sustainability necessary for marketing decisions in the creative industries [20].

This study examines data integration and knowledge sharing for decision-making in fashion companies. It notes the lack of integration of knowledge management, correlation rules extraction, sharing mechanisms, or feedback loops that update rules periodically. This absence of integration results in short, fragmented analysis outputs, duplicated efforts, and scattered knowledge [21] .

In conclusion, previous studies focused on the accuracy of models and recommendation pathways, but they did not integrate knowledge management or extract correlation rules within the institutional framework. Therefore, the patterns remain temporarily unsaved in metadata and are not linked to decision support systems, and no feedback is provided.

4. Literature Survey

Recent studies in the creative industries show that most of them have used association rules extraction from marketing data without transforming these rules into reusable knowledge. For example, in the fashion industry, Choi et al. (2024) used association rules extraction, but there was no knowledge repository to store these rules with their time and context. Similarly, Jain et al. (2021) applied the Apriori algorithm to real-world sales data in a clothing store to identify products sold together, but the extraction remained a one-time process and was not integrated into a system that updates the rules seasonally.

In the media sector, Díaz-Garcia et al. (2023) demonstrated that association rules extraction is heavily used on social media platforms like Twitter, but the focus has been on discovering the rules rather than how to store, share, or use them later. Owonipa et al.'s study further illustrates this point. (2024) to improve news attribution, but there was no link between the extracted rules and an editorial policy or a long-term content recommendation system. This also indicates the absence of a knowledge management layer in the media.

In the creative industries related to entertainment and film, both Annisa et al. (2024) and Nesmaoui et al. (2023) utilized GNN to improve recommendation accuracy, but the extracted rules were not stored in a repository upon which subsequent marketing decisions could be based, such as which film to promote in a given season or to which specific demographic. This means that the rule is created at the moment of recommendation and ends there.

In the other part of the studies on sustainable innovation in architecture and interior design, such as Metwally (2025) and Whiting et al. (2023) presented design solutions, but without a mechanism for storing and reusing these solutions. The same observation appeared in the study on handicrafts, such as Gatot Soepriyono's (2024) study, which applied the Apriori algorithm to batik sales, and Zainurrafiqi et al.'s (2025) study, which focused on innovation and batik branding. However, the rules extracted from sales/innovation were not stored with their attributes (season, customer, design) and were not reused in subsequent campaigns.

1- The absence of integrated knowledge management, as there is no rule repository or feedback system to continuously update data due to market changes.

2- Reliance on correlation rule extraction techniques without integrating them with knowledge management .

Therefore, in this research, we attempt to create an integrated framework that bridges these gaps and makes knowledge reusable.

Table 1 : summarize of some studies in Creative Industry

NO	Citation	Creative-Industry Sector	Rule Reuse (Yes/No)	Gaps

1	Choi, W., Lee, Y., & Jang, S. (2024) [22]	Fashion	No	The absence of a KM framework: there is no knowledge repository for the rules with time/seasonal metadata, and no governance or feedback loop linking the rules to campaign results for updating.
2	Jain, A., Jain, S., & Merh, N. (2021). [23]	Fashion (Clothing Retail)	No	The KM gap is clear: there is no Capture/Store/Share/Feedback, no rules repository, and no periodic update policies linking rules to future seasons/shows.
3	Díaz-Garcia, J.A., Ruiz, M.D., & Martín-Bautista, M.J. (2023). [24]	Media / Social media analytics	No – focus on extracting rules from social media only, without a system to reuse or update them.	It focuses solely on extracting rules, with no knowledge repository, metadata, or feedback, so it still needs KM.
4	Owonipa, A.A. et al. (2024) [25]	Media / News & multimedia	No – extract the rules to improve news attribution only, without storage or subsequent reuse.	There is no KM framework that stores rules or links them to an editorial/recommendation policy. The rules are instantaneous and are left without updating or governance.
5	Annisa, S., Rini, D.P., & Abdiansah. [26]	Film / Movie platforms (film recommendation system)	No – they extracted rules/patterns to suggest movies but they didn't return them to the repository or say they would reuse them later.	There is no KM for storing rules with metadata (cluster, extraction time, audience type), and there is also no feedback and no marketing decisions for the platform.
6	Nesmaoui, R., Louhichi, M., & Lazaar, M. (2023) [27]	Film / AV media (movie platforms)	No	The focus is on the accuracy of the recommendation, not on preserving the rules with metadata (type, year, audience) or on updating them or linking them to subsequent promotional campaigns; there is no KM layer to organize and reuse.
7	Metwally, W.M. (2025) [28]	Architecture / Green Architecture	No - Sustainable architectural review and innovations, but there is no system that reuses or stores solutions.	There is no KM layer that gathers vital innovations into a single repository with metadata (building type, climate, SDGs), and no update/evaluation loop, so the innovations remain theoretical recommendations.
8	Whiting, P., Cullen, V., Adkins, H., & Chatteur, F. (2023). [29]	Interior Design / Retail, Circular Design	No	The framework explains "how to design a circular design" but does not provide a KM repository for storing material solutions/details/suppliers.

9	Gatot Soepriyono (2024). [30]	Handicrafts / Batik SMEs	No – they extracted rules (e.g., T09→T12) but did not store them or use them in subsequent campaigns.	There is no KM warehouse that saves rules with metadata (support/trust/model/season), the rules are real-time and there is no feedback linking them to inventory or marketing decisions.
10	Zainurrafiqi, Saifi, Kusumawati, Sunarti (2025). [31]	Handicrafts / Traditional Crafts (Batik)	No – focus on innovation and branding, no organized reuse of knowledge or rules.	There is no KM layer organizing the description of the craft/designs/market results, nor is the analysis results integrated into a recommendation system or marketing platform for crafts, so knowledge remains scattered.

a. Literature Analysis

The analysis of previous studies listed in the table shows that most of the work focused on extracting primary knowledge from data in creative industries (such as fashion in the studies by Choi, 2024 and Jain, 2021; media in the studies by Díaz-Garcia, 2023 and Owonipa, 2024; crafts in the studies by Gatot, 2024 and Zainurrafiqi, 2025; and architecture/design in the studies by Metwally, 2025 and Whiting et al., 2023) using mining tools such as Apriori and FP-Growth, or integrating them with Recommendation, CF, and GNN, as in Annisa and Nesmaoui. This demonstrates that ARM is an accepted and practically applied tool in various creative sectors.

However, in contrast, the analysis reveals a recurring pattern: almost all of these studies treated the rules as a one-time analytical output, meaning they are used within the experiment or study and then not reorganized, stored, or updated. No study presented a clear knowledge management (KM) framework that stores the rules along with metadata (sector, season, campaign, cluster, recommendation performance), nor did it mention the reuse of rules in subsequent marketing cycles or the existence of a feedback loop that would allow for refining the rules over time. Even studies that focused on sustainability or design learning remained at the framework/model level without an operational rules repository.

Therefore, we can conclude that the common gap between these creative industries is the absence of an integration layer between knowledge management and the extraction of association rules. This integration makes the extracted rules sustainable, always up-to-date, and re-shared. Herein lies the contribution of the current research: transforming ARM from a “one-shot” process into a knowledge system geared towards marketing decisions.

2. Proposed KM–ARM Framework (or System Architecture)

To address the identified gap, this section presents a KM–ARM framework that embeds association rule mining within a continuous knowledge management cycle. The proposed architecture links data acquisition, rule extraction, and rule annotation with a feedback-enabled knowledge repository to support sustainable marketing decisions in creative industries.

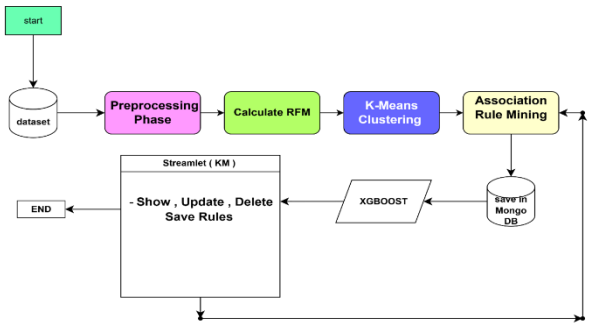

Figure 3.1: The Flowchart model Of merge KM with ARM for marketing decision .

We designed this system architecture to integrate knowledge management with association rule extraction to support marketing decisions and improve decision-making. As illustrated in Figure 3.1 below, the system consists of several sequential stages that transform data from its raw form into actionable marketing knowledge.

The process begins with a dataset, which undergoes preprocessing, such as cleaning, removing inconsistent fields, and preparing it for the next stage. RFM (recency, frequency, and value) is then calculated to generate several customer behavioral attributes. These attributes are then used in the next stage, the clustering stage, using the K-Means algorithm, which divides customers into distinct groups based on their purchasing behavior. Like the group that is always active, or the inactive group that has just registered in the system, or the active group but at intermittent periods, and other groups.

After the clustering process, an association rule extraction algorithm is applied to each of these groups. These extracted rules are then stored in the MONGO DB database for future operations and further analysis.

I also add here tools for machine learning, and here XGBOOST has been added. The XGBOOST model was used to classify new customers from the database based on their RFM, assigning them to the groups we had previously divided them into. These processes were then displayed on the STREAMLIT knowledge management interface, allowing marketing managers to read, update, and modify them, ensuring the continued development of these knowledge assets.

The proposed architecture includes a feedback loop between the knowledge management layer (Streamlit interface) and the association rule extraction module. After the initial rules are generated, the expert user evaluates them (accept, reject, seasonal/segmental classification, or priority adjustment), and this feedback is stored in the knowledge base. This feedback is then used to refine extraction criteria in subsequent cycles (such as support and trust limits or cluster scope), thus transforming ARM from a one-time analytical process to an iterative, knowledge-driven learning process.

This structure ensures not only knowledge extraction but also its systematic management, storage, and reuse, facilitating the analysis of raw data and strategic marketing decision-making .

6 . Conclusion

Analyzing previous studies, we find that the application of Association Rule Mining (ARM) techniques in creative industries such as fashion, tourism, and e-commerce has achieved significant results in extracting patterns and improving recommendation systems. However, the lack of integration of these rules within a knowledge management (KM) framework remains an obstacle to the sustainability and accuracy of marketing decisions. The extracted rules are often used momentarily without being saved, updated, or linked to their temporal and marketing context, which reduces their long-term value. Integrating KM with ARM not only ensures knowledge preservation but also enhances the possibility of reusing and improving it over time, which positively impacts marketing strategies in creative industries.

1. Most studies have focused on extracting rules or instant recommendations without implementing an integrated knowledge management lifecycle.
2. The absence of organized knowledge repositories leads to a loss of knowledge accumulation and difficulty tracking or updating rules.
3. Some studies have directly linked rules to marketing actions, but without a governance system or regular updating.
4. Integrating KM with ARM enables rules to be stored with metadata (such as support, trust, and history) for easy reuse.
5. Integrating KM with ARM enhances the accuracy and sustainability of marketing decisions and prevents performance decline as markets change.

Overall, the KM–ARM integration provides a unified framework that strengthens organizational learning and enables broader applications across creative domains including fashion, tourism, and e-commerce helping organizations maintain competitiveness in an ever-evolving market.

7 . Future Work

This research focuses on integrating knowledge management with association rule extraction to support creative industries in sustainable marketing. Future work could focus on the following directions:

1 - Integrating artificial intelligence models such as deep learning (LSTM, GNN) to capture complex consumer behavior .

2 - Developing modern systems capable of continuous learning where rules are automatically updated as the market and its data evolve . This is what we have indicated in the feedback system in the proposed system .

3. Building repositories to store rules and then display them on interactive dashboards, enabling marketers to visualize and store rules, then effectively reuse them and make important decisions.

4. Expanding the scope of use: The proposed framework should be tested in multiple creative environments, such as fashion, digital media, music, and the film industry, to confirm the model's flexibility and validity across diverse sectors within the creative industries.

5 - Linking the results to marketing performance measurement, where the extracted and stored rules are integrated into performance evaluation systems (KPIs), such as conversion rates and customer retention, allowing for a direct measurement of the impact of knowledge management on marketing results.

References

[1] T. Tamm, P. Hallikainen, and Y. Tim, "Creative analytics: Towards data-inspired creative decisions," *Information Systems Journal*, vol. 32, pp. 729–753, Sep. 2021, doi: 10.1111/isj.12369.

[2] "LEVERAGING MARKET BASKET ANALYSIS FOR ENHANCED UNDERSTANDING OF SOCIAL MEDIA PLATFORM USAGE," *Issues In Information Systems*, 2024, doi: 10.48009/2_iis_2024_129.

[3] S. Chakraborty, Md. S. Hoque, N. Rahman Jeem, M. C. Biswas, D. Bardhan, and E. Lobaton, "Fashion Recommendation Systems, Models and Methods: A Review," *Informatics*, vol. 8, no. 3, p. 49, Jul. 2021, doi: 10.3390/informatics8030049.

[4] Y. Mayasari and T. Chandra, "Social capital for knowledge management system of the creative industry," *Journal of Enterprising Communities: People and Places in the Global Economy*, vol. 14, no. 4, pp. 481–494, Jul. 2020, doi: 10.1108/JEC-01-2020-0008.

[5] O. Dogan, F. C. Kem, and B. Oztaysi, "Fuzzy association rule mining approach to identify e-commerce product association considering sales amount," *Complex & Intelligent Systems*, vol. 8, no. 2, pp. 1551–1560, Apr. 2022, doi: 10.1007/s40747-021-00607-3.

[6] M. Zekić-Sušac and A. Has, "Data Mining as Support to Knowledge Management in Marketing," *Business Systems Research Journal*, vol. 6, no. 2, pp. 18–30, Sep. 2015, doi: 10.1515/bsrj-2015-0008.

[7] S. Kovalchuk, "Creative Economy and Value Creation through Marketing Analytics: New Approaches and Opportunities," *Pakistan Journal of Life and Social Sciences (PJLSS)*, vol. 22, no. 2, 2024, doi: 10.57239/PJLSS-2024-22.2.00741.

[8] M. Alavi and D. E. Leidner, "Review: Knowledge Management and Knowledge Management Systems: Conceptual Foundations and Research Issues," *MIS Quarterly*, vol. 25, no. 1, p. 107, Mar. 2001, doi: 10.2307/3250961.

[9] S. Umezurike, O. Kufile, A. Onifade, B. Otokiti, and O. Ejike, "Review of Knowledge Management Integration into Strategic Corporate Decision-Making Processes," *Int. J. Sci. Res. Sci. Technol.*, vol. 12, pp. 1212–1223, Jun. 2025, doi: 10.32628/IJSRST25123231.

[10] R. Yanti, P. Maradjabessy, Q. Qurtubi, and I. P. Rachmadewi, "Determining the retail sales strategies using association rule mining," *International Journal of Advances in Applied Sciences*, vol. 13, p. 530, Sep. 2024, doi: 10.11591/ijaas.v13.i3.pp530-538.

[11] M. Zekić-Sušac and A. Has, "Data Mining as Support to Knowledge Management in Marketing," *Business Systems Research Journal*, vol. 6, no. 2, pp. 18–30, Sep. 2015, doi: 10.1515/bsrj-2015-0008.

[12] M. J. Shaw, C. Subramaniam, G. W. Tan, and M. E. Welge, "Knowledge management and data mining for marketing," *Decis. Support Syst.*, vol. 31, no. 1, pp. 127–137, May 2001, doi: 10.1016/S0167-9236(00)00123-8.

[13] H. R. Nemati, D. M. Steiger, L. S. Iyer, and R. T. Herschel, "Knowledge warehouse: an architectural integration of knowledge management, decision support, artificial intelligence and data warehousing," *Decis. Support Syst.*, vol. 33, no. 2, pp. 143–161, Jun. 2002, doi: 10.1016/S0167-9236(01)00141-5.

[14] R. Agrawal and R. S&ant, "Fast Algorithms for Mining Association Rules."

[15] H. R. Nemati, D. M. Steiger, L. S. Iyer, and R. T. Herschel, "Knowledge warehouse: an architectural integration of knowledge management, decision support, artificial intelligence and data warehousing," *Decis. Support Syst.*, vol. 33, no. 2, pp. 143–161, Jun. 2002, doi: 10.1016/S0167-9236(01)00141-5.

[16] R. Bose and V. Sugumaran, "Application of knowledge management technology in customer relationship management," *Knowledge and Process Management*, vol. 10, no. 1, pp. 3–17, Jan. 2003, doi: 10.1002/kpm.163.

[17] Y. Yang and Y. C. Ko, "Design and Application of Handicraft Recommendation System Based on Improved Hybrid Algorithm," *Intern. J. Pattern Recognit. Artif. Intell.*, vol. 36, no. 02, Feb. 2022, doi: 10.1142/S0218001422500082.

[18] L. G. J. P. K. B. B. Leininger, "Advancing Performance of Retail Recommendation Systems," *SMU Data Science Review*, vol. 3, no. 1, 2020.

[19] H. Sachdeva and S. Pandey, "Interactive Systems for Fashion Clothing Recommendation," 2020, pp. 287–294. doi: 10.1007/978-981-13-7403-6_27.

[20] S. Chakraborty, Md. S. Hoque, N. Rahman Jeem, M. C. Biswas, D. Bardhan, and E. Lobaton, "Fashion Recommendation Systems, Models and Methods: A Review," *Informatics*, vol. 8, no. 3, p. 49, Jul. 2021, doi: 10.3390/informatics8030049.

[21] A. Acharya, S. K. Singh, V. Pereira, and P. Singh, "Big data, knowledge co-creation and decision making in fashion industry," *Int. J. Inf. Manage.*, vol. 42, pp. 90–101, Oct. 2018, doi: 10.1016/j.ijinfomgt.2018.06.008.

[22] W. Choi, Y. Lee, and S. Jang, "Diffusion of fashion trend information: a study on fashion image mining from various sources," *Fashion and Textiles*, vol. 11, no. 1, p. 30, Aug. 2024, doi: 10.1186/s40691-024-00394-8.

[23] A. Jain, S. Jain, and N. Merh, "Application of Association Rule Mining in a Clothing Retail Store," 2021, pp. 103–114. doi: 10.1007/978-981-33-6656-5_9.

[24] J. A. Diaz-Garcia, M. D. Ruiz, and M. J. Martin-Bautista, "A survey on the use of association rules mining techniques in textual social media," *Artif. Intell. Rev.*, vol. 56, no. 2, pp. 1175–1200, Feb. 2023, doi: 10.1007/s10462-022-10196-3.

[25] A. Abimbola Owonipa, T. Oladele Aro, and O. Adunni Olukiran, "Multimedia Data Mining and Processing for News Source Attribution," *International Journal of Research and Review*, vol. 11, no. 5, pp. 48–59, May 2024, doi: 10.52403/ijrr.20240507.

[26] S. Annisa, D. P. Rini, and A. Abdiansah, "Collaborative Filtering Recommendation System Using A Combination of Clustering and Association Rule Mining," *Journal of Information Systems and Informatics*, vol. 6, no. 3, pp. 1499–1516, Sep. 2024, doi: 10.51519/journalisi.v6i3.802.

[27] R. Nesmaoui, M. Louhichi, and M. Lazaar, "A Collaborative Filtering Movies Recommendation System based on Graph Neural Network," *Procedia Comput. Sci.*, vol. 220, pp. 456–461, 2023, doi: 10.1016/j.procs.2023.03.058.

[28] W. M. Metwally, "Biomimicry and Green Architecture: Nature-Inspired Innovations for Sustainable Buildings," *Sustainability*, vol. 17, no. 16, p. 7223, Aug. 2025, doi: 10.3390/su17167223.

[29] P. Whiting, V. Cullen, H. Adkins, and F. Chatteur, "A New Retail Interior Design Education Paradigm for a Circular Economy," *Sustainability*, vol. 15, no. 2, p. 1487, Jan. 2023, doi: 10.3390/su15021487.

[30] G. Soepriyono, "Penerapan Market Basket Analysis Data Mining Pada Penjualan Batik dengan Menerapkan Algoritma Apriori," *Journal of Computer System and Informatics (JoSYC)*, vol. 5, no. 3, pp. 516–525, May 2024, doi: 10.47065/josyc.v5i3.5198.

[31] Z. Zainurrafiqi, M. Saifi, A. Kusumawati, and S. Sunarti, "Revitalizing traditional crafts: How innovation and branding capability drive business success in batik SMEs," *Edelweiss Applied Science and Technology*, vol. 9, no. 4, pp. 2803–2812, Apr. 2025, doi: 10.55214/25768484.v9i4.6654.