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REVISITING THE TECHNOLOGY ACCEPTANCE MODEL IN THE AGE OF ARTIFICIAL INTELLIGENCE: A BIBLIOMETRIC ANALYSIS OF TAM IN BUSINESS AND MARKETING LITERATURE

YAPAY ZEKA ÇAĞINDA TEKNOLOJİ KABUL MODELİNİN YENİDEN GÖZDEN GEÇİRİLMESİ: İŞLETME VE PAZARLAMA LİTERATÜRÜNDE TAM'IN BİBLİYOMETRİK ANALİZİ

Yiğit YURDER*

Abstract

This study presents a comprehensive bibliometric analysis of research on the Technology Acceptance Model (TAM) in the marketing and business literature. Publications between 2004 and 2024 were selected from the Scopus database, and keyword co-occurence and cluster analysis were performed using VOSviewer. The study is analyzed in three periods (2004-2011, 2012-2019, 2020-2024) to examine the evolution of TAM over time. The results show that in the first period, basic e-commerce and consumer behavior issues were at the forefront, while trust and risk perception gained importance in the second period. The last period emphasizes the growing role of TAM in innovative areas such as artificial intelligence, cloud computing and financial technology. This study reveals how TAM adapts to current technological developments in the marketing and business context and provides direction for future research.

Keywords: Technology acceptance model, marketing, business, bibliometric analysis, artificial intelligence
JEL Classification: M31

Özet

Bu çalışma, pazarlama ve işletme literatüründe Teknoloji Kabul Modeli (TAM) üzerine yapılan araştırmaların kapsamlı bir bibliyometrik analizini sunmaktadır. Scopus veri tabanından 2000-2024 yılları arasındaki yayınlar seçilmiş ve VOSviewer kullanılarak anahtar kelime eşzamanlılığı ve küme analizi yapılmıştır. Çalışma, TAM'ın zaman içindeki evrimini incelemek için üç dönemde (2004-2011, 2012-2019, 2020-2024) analiz edilmiştir. Sonuçlar, ilk dönemde temel e-ticaret ve tüketici davranışı konularının

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ön planda olduğunu, ikinci dönemde ise güven ve risk algısının önem kazandığını göstermektedir. Son dönem ise yapay zekâ, bulut bilişim ve finansal teknoloji gibi yenilikçi alanlarda TAM'ın artan rolüne vurgu yapıyor. Bu çalışma, TAM'ın pazarlama ve iş bağlamında güncel teknolojik gelişmelere nasıl uyum sağladığını ortaya koymakta ve gelecekteki araştırmalar için yön göstermektedir.
Anahtar Kelimeler: Teknoloji kabul modeli, pazarlama, işletme, bibliyometrik analiz, yapay zeka
JEL Sınıflandırılması: M31

1. Introduction

In the 21st century, the way in which people have and will adopt ever-increasing technological advances has become the focus of much research in the literature. In the last 20 years, there has been significant progress in explaining and predicting people's adoption of technologies. Much of this research has been aided theoretically and empirically by the Technology Acceptance Model (Davis, 1989). The technology acceptance model is a model developed from the theory of reasoned action (TRA) and the theory of planned behavior (TPB) with the aim of helping people understand the use and adoption of new technologies.

The theory of reasoned action (Fishbein & Ajzen, 1977) is a widely used model for predicting intentions and behaviors. According to the theory of reasoned action, beliefs that are antecedents of behavioral intention are divided into normative and behavioral. While behavioral beliefs underline the effect of attitudes towards performing the action, normative beliefs have an effect on subjective norms about performing the behavior. Compared to TRA, TPB has not been as widely studied and tested as the former theory. However, it has been used by more disciplines and has been found to be more consistent in predicting consumer behavior than TRA (Bagozzi & Warshaw, 1990; Boldero, Moore & Rosenthal, 1992;Beale & Manstead, 1991).

The planned behavior model is an intention model that tries to identify the factors that make up the behavior of people with conscious intentions (Davis et al., 1989). In the theory of planned behavior, the three components that affect intention are attitude towards behavior, subjective norms and behavioral control, which are shaped by three different types of beliefs: behavioral, normative and control. Behavioral beliefs are the subjective probabilities in a person's mind about what might happen as a result of the behavior and determine the person's attitude towards the behavior. Normative beliefs, on the other hand, are formed based on the opinions of the people around the person when he/she performs the behavior and affect his/her subjective norms. Control beliefs, on the other hand, are a form of beliefs formed by perceptions about abilities, resources and opportunities and provide the behavioral control component specific to the Theory of Planned Behavior. (Ajzen, 1985).

In the technology acceptance model, perceived ease of use (the perception of how much effort one will exert when using a particular technology) and perceived usefulness (the subjective perception of how much the new technology will improve one's performance) are the components that affect one's attitude towards using the technology. In addition, in the model, perceived usefulness has a direct effect on intention, Davis (1989) stated this relationship as "people's intention to use a technology depends to a large extent on how much that technology will improve their performance". Furthermore, one of

the hypotheses of the model is that perceived ease of use has a direct effect on perceived usefulness. This model has been used in many marketing studies (Featherman and Pavlou,2003; Wong et al., 2014; Agag and El-Masry, 2016; Choe et al., 2021) to understand the perceptions and attitudes of consumers in the process of adopting new technologies such as e-commerce (Ha, 2020; Copeland et al., 2023; Gefen et al., 2003), smart phones(Xia et al., 2018; Chen et al., 2011; Ooi and Tan,2011), smart home appliance (Park et al.,2017; Hubert et al., 2019) , e-health (Purwanto and Budiman, 2020), wearable technologies (Nasir and Yurder, 2015; Kim and Shin, 2015) , mobile banking (Aboelmaged and Gebba,2013), augmented reality (Elshafey et al., 2020) and artificial intelligence (Na et al., 2022) especially after the 2000s, and has become one of the basic theories of the marketing field.

The aim of this study is to conduct a comprehensive bibliometric analysis of research utilizing the Technology Acceptance Model (TAM) within the fields of business and marketing. While TAM has been widely applied across various domains, there has been limited effort to systematically map how this model has evolved thematically and geographically over time in these specific contexts. To address this gap, the study examines articles published between 2004 and 2024 that include the term "Technology Acceptance Model" and are indexed in the Scopus database under business and marketing categories. Using bibliometric techniques and keyword co-occurrence analysis via VOSviewer, the study identifies major research clusters, tracks conceptual trends over time, and offers insights into how TAM has been applied and expanded in relation to emerging technologies such as artificial intelligence, fintech, and e-commerce.

2. Methodology

This study employs a bibliometric methodology to investigate the development and dissemination of the Technology Acceptance Model (TAM) within business and marketing literature. Bibliometric analysis provides a structured and replicable approach to mapping scientific output, enabling the identification of publication trends, influential contributors, and evolving research themes (Zupic & Čater, 2015; Donthu et al., 2021). The methodological process consists of four key stages, as detailed below.

Building on the methods outlined by Sweileh (2018) and Yas et al.(2020), the data used for this research were sourced from the Elsevier Scopus database. Launched in 2004, Scopus is a comprehensive resource that includes over 90,6 million records dating back to 1969. This vast collection comprises more than 26.591 peer-reviewed journals, 192 trade publications, 1.167 book series, and documentation from over 148.500 scientific events across the globe (Elsevier Guide, 2023). As a result, Scopus is recognized as one of the most inclusive databases for examining the current landscape of global research.

2.1. Determining the Search Keywords

The Scopus database was selected as the primary data source for its comprehensive indexing and wide disciplinary coverage. The keyword "Technology Acceptance Model" was used to search the title and

keyword fields. To narrow the focus to relevant disciplines, the results were filtered to include only journals with "business" or "marketing" in their titles. The time frame was limited to 2004–2024**,** aligning with the expansion of AI and digital technologies in the business domain and ensuring consistency with the coverage period of the Scopus database. Only peer-reviewed journal articles in English were included in the final dataset.

2.2. Data Cleaning and Formatting

To ensure transparency and reproducibility in the article selection process, this study followed the PRISMA 2020 guidelines (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) developed by Page et al. (2021). While PRISMA was originally designed for systematic reviews, its structured flowchart format has been increasingly adapted in bibliometric analyses to visualize document inclusion and exclusion procedures (e.g., Gümüş et al., 2019; Donthu et al., 2021). Accordingly, a PRISMA flow (Figure 1.) was developed to document each filtering stage used to construct the final dataset.

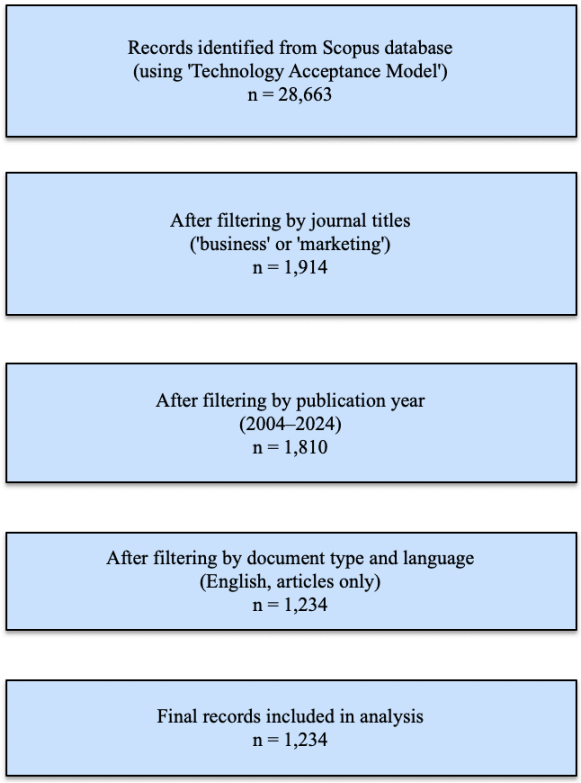

Figure 1: PRISMA Flow

2.3. Initial Analysis

To gain a comprehensive understanding of the overall landscape of research on the Technology Acceptance Model (TAM), several basic descriptive bibliometric indicators were analyzed. First, the annual distribution of publications was examined to identify temporal trends and identify periods of increased scholarly interest in the subject. This trend analysis helped contextualize the growth and development of TAM-related research across the two decades covered in the study.

Second, the geographical distribution of publications was assessed by analyzing the country affiliations of the contributing authors. This provided insights into the regional dynamics of TAM research, highlighting the most active countries and their relative contributions to the field.

Finally, the journal-wise distribution and document types were reviewed to determine which academic outlets were most frequently publishing TAM-related work and to understand the dominant formats of scholarly communication (e.g., articles, reviews). These descriptive indicators served as a foundational overview of the dataset and helped to guide the structure and interpretation of the subsequent network and cluster analyses.

2.4. Data Analysis

In this phase of the analysis, bibliographic data were imported into VOSviewer, a specialized software for constructing and visualizing bibliometric networks. A keyword co-occurrence analysis was performed to identify the most prominent themes and research focuses within the selected body of literature. The analysis relied on author-supplied keywords, with a minimum occurrence threshold of 10 to ensure conceptual relevance and consistency. Keywords meeting this threshold were analyzed using the VOS 1.6.20 (Visualization of Similarities) mapping technique, which groups terms into clusters based on their frequency and co-occurrence patterns within the dataset. VOSviewer was released by Nees Jan van Eck and Ludo Waltman (2010). VOSviewer is a software tool for creating and exploring maps based on network data. While intended primarily for analyzing academic records, it can be used on any type of network data (social networks, e.g.).

The resulting clusters represent distinct conceptual domains within TAM research, offering insight into how scholars have approached the model from different angles over time. Each cluster was subsequently interpreted and labeled based on the dominant terms it contained, reflecting themes such as perceived usefulness, trust and risk, digital transformation, mobile commerce, and artificial intelligence.

To further explore the temporal evolution of research themes, the dataset was segmented into three distinct periods: 2004–2011, representing the early, pre-digital transformation phase of TAM literature; 2012–2019, characterized by the proliferation of mobile and digital platforms; and 2020–2024, reflecting a sharp rise in AI-focused studies influenced by the COVID-19 pandemic and rapid digital acceleration. This time-based segmentation allowed for a comparative analysis of how

keyword prominence and thematic emphases have shifted across different technological and societal contexts.

3. Bibliometric Analysis

This section presents a detailed account of the outcomes from the bibliometric analysis conducted on publications using the Technology Acceptance Model (TAM) in business and marketing research. The results are first introduced by outlining the general landscape of TAM-related research (Table 1), followed by a keyword analysis identifying the key research hot spots in TAM.

Table 1: Type of Documents

Type of document	Frequency	Ratio (%)
Article	1234	70,7
Conference Paper	347	19,9
Book chapter	165	9,4
Total	1746	100

Bibliometric analysis is widely recognized in the literature as a quantitative method for examining large sets of scientific data, such as journal articles, to uncover the main research areas and predict emerging topics (Yu et al., 2019). As highlighted by Van Eck and Waltman (2010), one of the major strengths of bibliometric analysis lies in the visual representation of results, which allows for clearer interpretation of complex relationships. For this reason, VOSviewer (version 1.6.20) was employed as the primary tool to map the keyword co-occurrences in this study.

3.1. Annual Trends of Publications

As a result of the search in the Scopus database, a total of 1746 publications related to technology acceptance model were found in journals in the field of business or marketing between 2004 and 2024. As can be seen in Figure 2, when the number of publications is compared by years, it is seen that there has been a continuous increase after 2006. This increase can be attributed to the rapidly increasing technological developments (youtube, iphone, etc.) that started in those years. The number of publications continued to increase at an average rate until 2019. However, after 2019, possibly related to the pandemic, there may be a rapid increase in the number of articles on consumer-technology adaptation, as consumers have to handle many transactions from home through technological means, meet many new technologies and face the process of adapting to them thus they had to adapt faster than usual to many technologies such as e-banking, e-commerce, e-health, e-retailing and related mobile applications, smart home systems, gaming consoles, VR (Hootsuite Global Digital Report, 2020) .

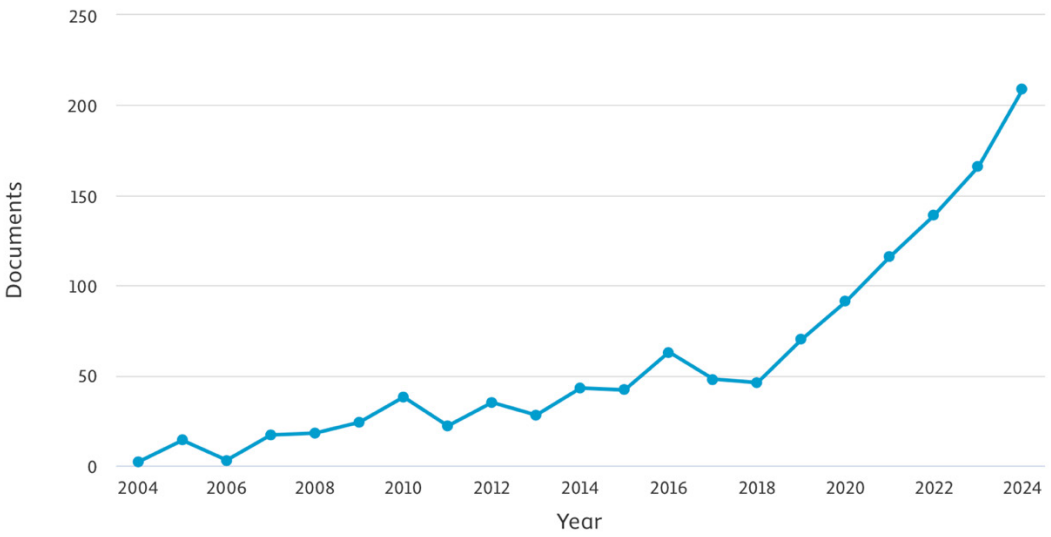

Figure 2: Publication numbers by years

In addition to comparing the number of publications by years, another critical dimension of bibliometric analysis is the distribution of publications by country. As shown in Table 2, the United States leads with the highest number of publications (211) related to the Technology Acceptance Model in business and marketing literature. It is followed by India (203), Malaysia (122), Indonesia (87), and the United Kingdom (73). Notably, three of the top five countries—India, Malaysia, and Indonesia—are located in Asia, indicating the regional prominence and growing academic interest in TAM across the Asian continent. This reflects a broader shift in research output toward emerging and technology-adaptive economies.

Table 2: Publication numbers by countries

Country	Number of publications
United States	211
India	203
Malaysia	122
Indonesia	87
United Kingdom	73
China	70
South Korea	59
Australia	54
Spain	45
Vietnam	45

Looking at the list top 10, it is observed that European countries are surprisingly behind in the number of publications compared to countries in USA and Asia. Looking at the countries on the list,

we understand that the issue of consumer technology adoption in business and marketing is much more important in Asia.

3.2. Keyword Analysis

The 1234 articles gathered from the Scopus database were first examined based on publication years and countries. After this initial analysis, the focus shifted to examining the keywords. By analyzing the co-occurrence of keywords, we identified key themes in the research surrounding the acceptance, adoption, and use of technologies within a business and marketing context. Among the 1234 articles in the study sample with 3396 of these keywords appearing only once. To create a visual co-occurrence network using VOSviewer, we set a minimum threshold of 10 occurrences per keyword, excluding those used fewer than 10 times from the analysis (Yu et al.,2020).

As Eck and Waltman point out in their study, in the co-occurrence network analysis of keywords, keywords are symbolized by colored circles and the size of these circles is proportional to the frequency of occurrence of the words in the titles and abstracts of publications. That is, if the keyword appears in more publications, they are represented in a way where the size of the text and the size of the circle is larger. This analysis allows the most frequently used keywords to be identified (Eck and Waltzman, 2010).

After setting a minimum threshold of 10 occurrences per keyword, the co-occurrence keyword analysis revealed that the most frequently used keywords are: technology acceptance model *(579),* unified theory of acceptance and use of technology *(139),* structural equation model *(114),* trust *(117),* perceived usefulness *(74),* perceived ease of use *(58),* behavioural intention *(53),* perceived risk *(50),* e-commerce *(56), and* technology adoption *(63).* The analysis identified 68 keywords that appeared in the keywords section of the publications at least 10 times, and these terms were categorized into 7 thematic clusters.

Although the term "Technology Acceptance Model" was used as a search keyword to identify relevant publications in Scopus, the co-occurrence analysis in VOSviewer is based on the author-supplied or indexed keywords provided in each publication's metadata. Therefore, while all 1234 articles are related to TAM, only 579 of them explicitly listed "Technology Acceptance Model" as a keyword. This discrepancy is common in bibliometric analyses, as many authors may mention the concept in the title or abstract but do not include it in the keyword section. As a result, the frequency in the co-occurrence map reflects keyword metadata, not the full-text content of the dataset.

Table 3: The Keywords With Highest Frequency

Keyword	Occurrences	Total Link Strength
Technology acceptance model	579	833
Utaut	139	237
Trust	117	277
Structural equation model	114	190

Perceived usefulness	74	187
Technology adoption	63	111
Perceived ease of use	58	156
E-commerce	56	104
Behavioral intention	53	125
Perceived risk	50	122

The distance between nodes indicates the strength of the relationship between them; a shorter distance suggests a stronger connection. The correlation between two words is shown by lines, with thicker lines representing higher co-occurrence frequency (Eck and Waltman, 2010). As shown in Table 3, the nodes with a total link strength higher than 100 are: technology acceptance model *(833),* trust *(277),* unified theory of acceptance and use of technology *(237),* structural equation model *(190),* perceived usefulness*(187),* perceived ease of use *(156),* behavioral intention *(125),* perceived risk *(122),* adoption *(111), and* e-commerce *(104).* These keywords demonstrate strong co-occurrence relationships with other terms in the network, indicating their central role in the thematic structure of TAM-related literature.

3.3. Research Subjects over Time

The evolution of the focus of research on the Technology Acceptance Model (TAM) in marketing and business contexts reveals how rapid technological developments and shifting user behaviors have influenced the model's application over time. This study divides the period between 2004 and 2024 into three intervals: 2004–2011, 2012–2019, and 2020–2024. Each phase highlights distinct thematic focuses, reflecting technological maturity, theoretical expansion, and global disruptions.

3.3.1. 2004–2011: Foundations of Digital Adoption and Early Applications of TAM

During this early stage, keywords such as *technology acceptance model* (52), *consumer behavior* (22), *e-commerce* (11), *trust* (11), and *innovation* (6) gained prominence. The period is characterized by the initial application of TAM to emerging online technologies and services.

- The *technology acceptance model* serves as the central concept, guiding early research in understanding user acceptance of web-based systems.
- Keywords like *consumer behavior*, *banking*, and *internet shopping* signal interest in how individuals interact with newly available e-commerce and virtual banking platforms.
- The presence of *innovation* and *mobile communication systems* suggests increasing attention toward mobile capabilities and their implications for business adoption.
- Keywords such as *customer satisfaction* imply a focus on consumer response in specific national contexts.

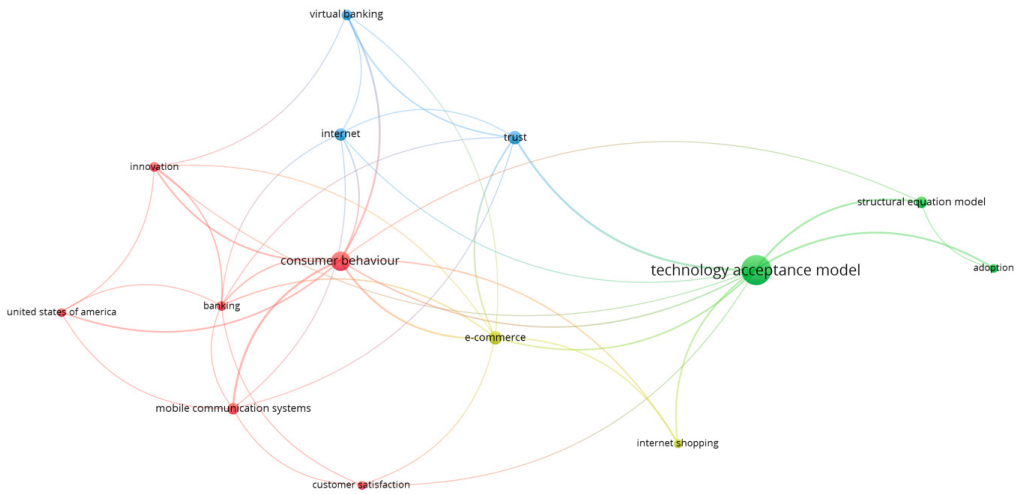

Figure 3: 2004-2011 Keyword Co-occurence Map

In sum, the 2004–2011 period laid the groundwork for TAM research by exploring its applicability to online services, e-commerce, and mobile banking, aligning closely with the internet's growing role in business transformation.

3.3.2. 2012–2019: Theoretical Enrichment and Diversification of Contexts

This middle phase marks a deepening of theoretical frameworks and an expansion into more diverse application areas. Prominent keywords include *technology acceptance model* (217), *trust* (42), *perceived usefulness* (29), *structural equation model* (35), *perceived ease of use* (20), and *unified theory of acceptance and use of technology* (25).

- *Trust* and *perceived risk* gain stronger emphasis, reflecting rising concerns around data security, especially in *e-commerce*, *internet banking*, and *online shopping* contexts.
- Keywords such as *india* and *social media* highlight a shift towards geographic diversification and social platform integration.
- Theoretical refinement is evident in the co-occurrence of constructs like *behavioural intention*, *attitude*, and *theory of planned behaviour*.
- The consistent centrality of TAM is reinforced by its coexistence with constructs from UTAUT and perceived value dimensions.

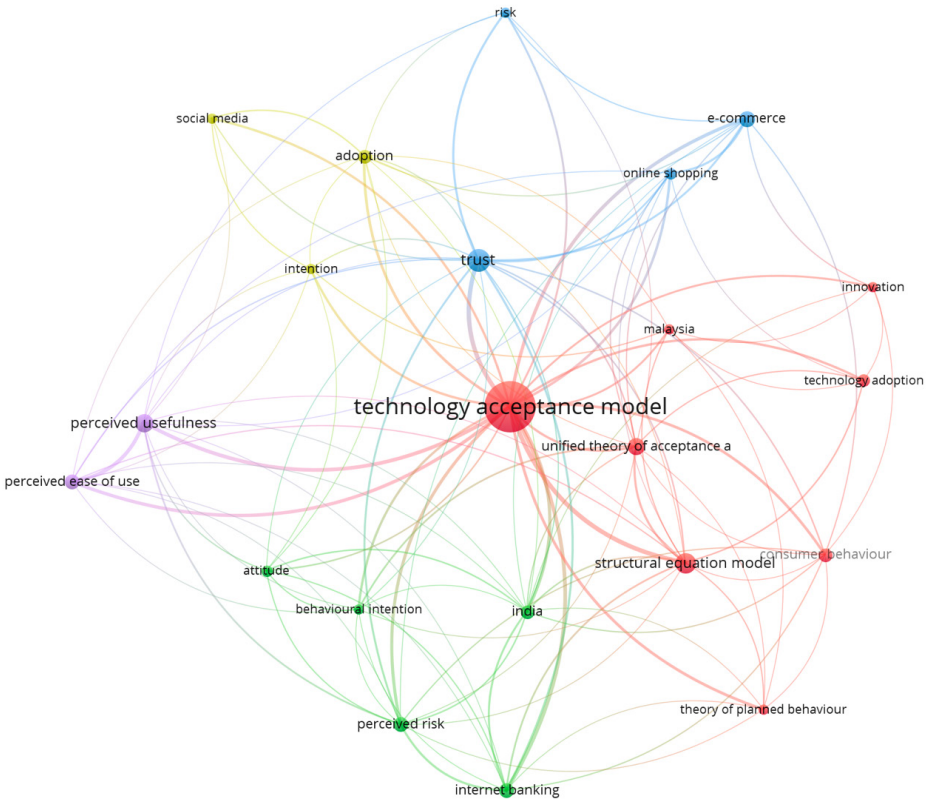

Figure 4: *2012-2019* Keyword Co-occurence Map

The Unified Theory of Acceptance and Use of Technology (UTAUT) is a widely recognized model developed to explain user intentions to adopt technology and subsequent usage behavior. Proposed by Venkatesh et al. (2003), UTAUT integrates elements from eight prominent acceptance models, including TAM, TRA, TPB, and others. The model identifies four key determinants of intention and usage—performance expectancy**,** effort expectancy**,** social influence and facilitating conditions—and also considers gender**,** age**,** experience, and voluntariness of use as moderating variables. UTAUT has been extensively applied across disciplines due to its comprehensive explanatory power and has served as a foundation for numerous extensions and adaptations, including UTAUT2, which incorporates consumer-oriented constructs such as hedonic motivation and price value. Its robustness and flexibility make UTAUT a central framework in contemporary technology acceptance research (Venkatesh et al., 2003).

Overall, this period showcases the evolution of TAM research into more sophisticated, multifactorial models that account for psychological and contextual variables, alongside a broadening scope of global and digital applications.

3.3.3. 2020–2024: Technological Complexity and Global Disruption

The most recent period reflects a convergence between TAM and advanced digital technologies, driven in part by global shifts such as the COVID-19 pandemic. Leading keywords include *technology acceptance model* (310), *unified theory of acceptance and use of technology* (113), *trust* (64), *artificialintelligence* (21), *fintech* (18), *covid-19* (35),and *technology adoption* (45).

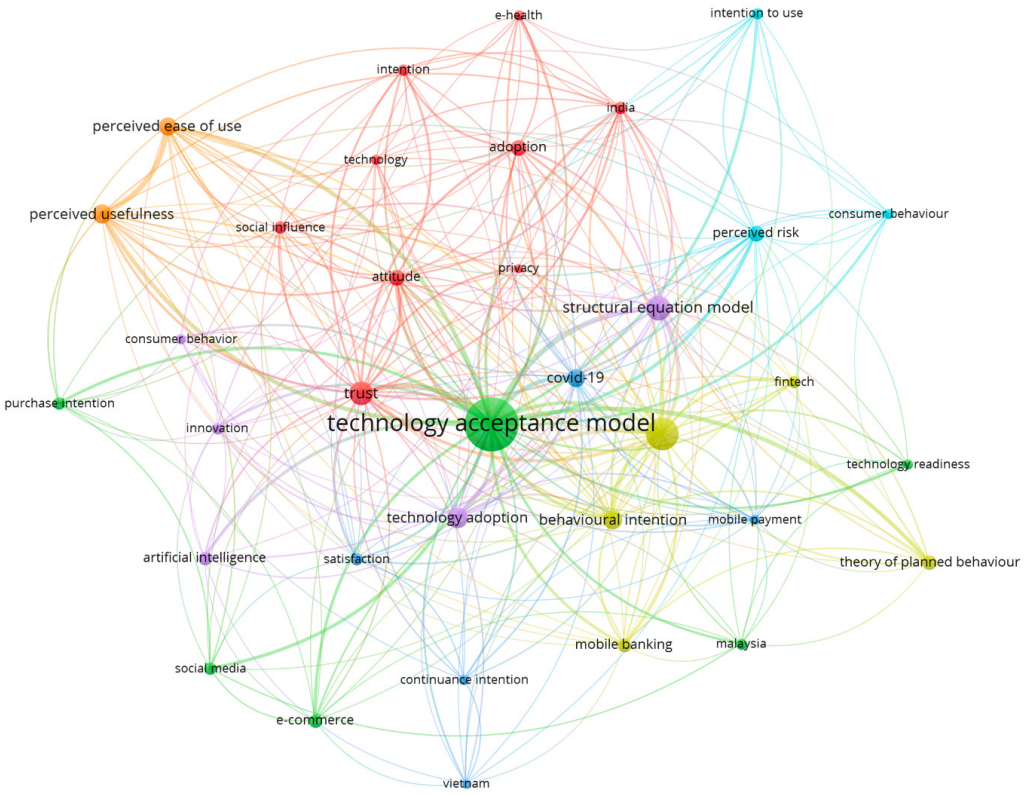

Figure 5: *2020-2024* Keyword Co-occurence Map

The appearance of *covid-19* as a co-occurring keyword signals the pandemic's catalytic effect on digital technology adoption and remote services.

Terms like *artificial intelligence*, *mobile banking*, *fintech*, and *e-health* reveal the integration of TAM into cutting-edge technology domains.

Theoretical constructs such as *behavioural intention*, *perceived usefulness*, and *social influence* remain vital, indicating continuity in the psychological underpinnings of acceptance.

Keywords like *technology readiness*, *mobile payment*, and *continuance intention* suggest a focus on long-term technology engagement beyond initial adoption.

In summary, the 2020–2024 period underscores TAM's adaptability to a digitally accelerated world. The research emphasis shifts toward emerging technologies and societal challenges, highlighting TAM's continued relevance in explaining and predicting technology usage under evolving conditions.

Comparing these three time periods reveals a clear evolution in Technology Acceptance Model (TAM) research. Each interval reflects how researchers have engaged with the concept of technology acceptance and how this approach has transformed in response to technological innovation, contextual demands, and global developments.

The 2004–2011 period represents the foundational phase of TAM research, during which core applications and early digital adoption contexts were at the forefront. A strong emphasis was placed on e-commerce and consumer behavior, as the rise of the internet as a new marketplace led scholars to investigate how consumers interacted with online shopping platforms. Consequently, keywords such as technology acceptance model, consumer behavior, e-commerce, and trust became prominent. This period also included emerging concepts such as mobile communication systems and virtual banking, reflecting the nascent but growing role of mobile and online financial services. In line with the traditional TAM structure, factors like perceived usefulness and perceived ease of use began to be examined in these early digital settings. Thus, this phase laid the groundwork for applying TAM in internet-based services and online commercial environments.

The 2012–2019 period signifies a transition toward more theoretically enriched and diversified TAM research. During this time, key concepts such as trust, perceived risk, structural equation model, perceived usefulness, and perceived ease of use appeared with increasing frequency, reflecting the model's deepening theoretical structure. The growing complexity of digital platforms prompted scholars to examine the role of trust and privacy concerns in shaping user acceptance. The presence of keywords like unified theory of acceptance and use of technology (UTAUT), behavioral intention, attitude, and theory of planned behavior highlights the adoption of extended theoretical models that moved beyond the original TAM framework. Additionally, geographically specific keywords such as India and themes like online shopping and social media suggest a growing international scope of TAM research and its relevance across different cultures and technological ecosystems. This period demonstrates both conceptual expansion and increased contextual sensitivity within TAM-related studies.

The 2020–2024 period reflects the integration of TAM into complex, high-velocity technological environments, shaped significantly by global events. The keyword COVID-19 emerged as a defining element, indicating the pandemic's accelerating effect on digital transformation and the increased urgency of understanding technology adoption in times of disruption. Research during this phase focused heavily on the acceptance of advanced technologies, as shown by the prevalence of keywords such as artificial intelligence, fintech, mobile payment, technology adoption, and cloud computing. Classic TAM variables like behavioral intention, perceived usefulness, and social influence remained central, reaffirming their importance in understanding user experience even as technologies evolved. The persistence of UTAUT, along with new keywords such as technology readiness and continuance intention, underscores the ongoing relevance of both foundational and extended acceptance models. This period also illustrates a heightened focus on the societal dimensions of adoption, emphasizing not only individual acceptance but also the broader socio-technical and organizational impacts of technology.

In summary, the comparison across these three periods clearly demonstrates the dynamic evolution of TAM research in response to changing technological, societal, and contextual landscapes. From its early focus on internet-based services and consumer interaction to its current application in AI, fintech, and pandemic-era technologies, TAM has shown remarkable flexibility and adaptability. The continued prominence of constructs like trust, risk, and behavioral intention—alongside the rise of new digital domains—positions TAM as a robust and evolving model for analyzing technology acceptance in the 21st century.

3.4. Cluster Analysis

As mentioned earlier, using VOSviewer, the co-occurrence network was analyzed to identify different clusters, each representing a key research area of focus in TAM studies. These clusters, indicated by color-coded groups (Figure 6.), reveal the different dimensions of technology acceptance and adoption that have been researched by scholars in various applications and contexts. The keywords of each cluster highlight specific theoretical frameworks, areas of practice and emerging technological interests, offering insights into the progression of TAM research and its adaptation to emerging trends and challenges. By examining these clusters in detail, we can better understand the dominant themes, how they relate to each other and how they collectively contribute to a comprehensive view of technology adoption research.

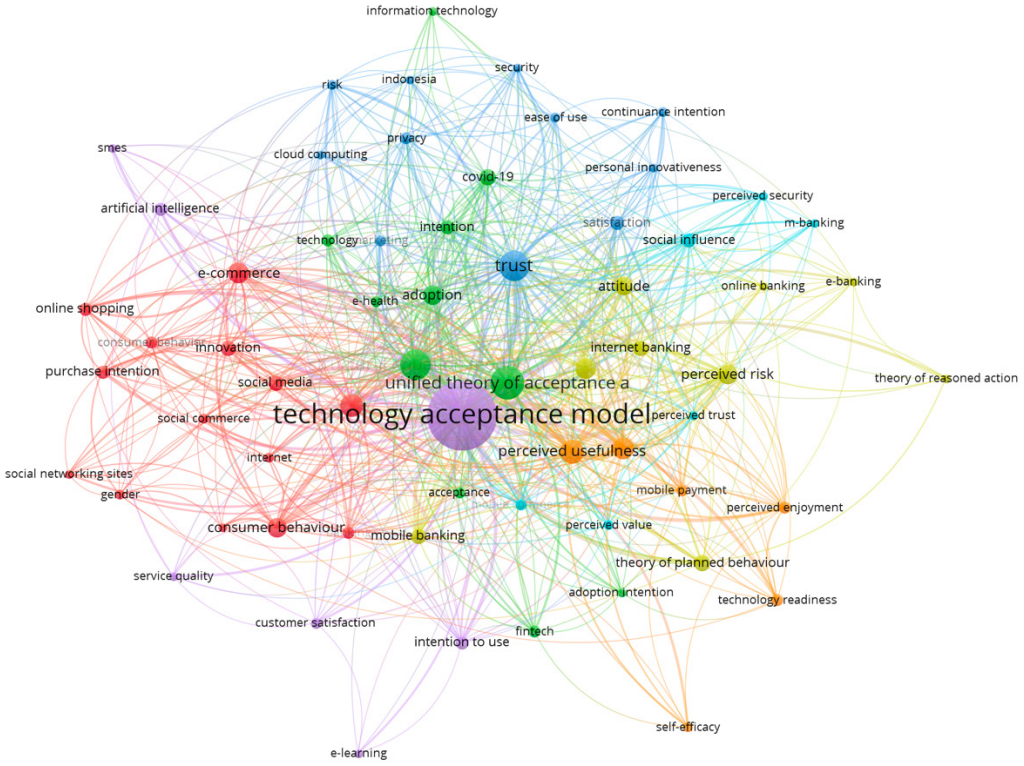

Figure 6: The Keywords Co-Occurence Network of Business and Marketing Technology Adoption Related Publications

Purple Cluster – Innovation, AI, and Technology Integration:

Key Themes: Artificial intelligence, SMEs, technology marketing, innovation, cloud computing, technology adoption.

This smaller but significant cluster reflects TAM's application in emerging and enterprise-level technologies. *Artificial intelligence* and *cloud computing* represent advanced systems where user acceptance is critical for implementation. *Innovation* and *technology marketing* suggest a strategic interest in not only how technologies are used, but how they are positioned and perceived. The presence of *SMEs* indicates that TAM is being employed in organizational studies as well, especially in relation to technology-driven competitiveness.

Red Cluster – Social Commerce, Consumer Behavior, and Online Marketing:

Key Themes: Consumer behaviour, social media, social commerce, online shopping, purchase intention, internet, service quality, gender, social networking sites.

This cluster focuses on the intersection between technology and consumer decision-making, particularly in online environments. The presence of *social commerce*, *purchase intention*, and *consumer behaviour* indicates that TAM is frequently applied to understand digital shopping behaviors. The inclusion of *social media* and *service quality* links user perception and interaction with technology-facilitated services. Demographic factors such as *gender* also appear, reflecting more nuanced segmentation in acceptance research.

Green Cluster – Core Acceptance Models and Theoretical Integration:

Key Themes: Technology acceptance model, unified theory of acceptance and use of technology (UTAUT), perceived usefulness, perceived ease of use, behavioural intention, intention to use, attitude, acceptance, e-health, adoption.

This cluster contains the foundational constructs of TAM and its theoretical extensions. *Perceived usefulness* and *ease of use* remain at the conceptual core, while the presence of *UTAUT*, *attitude*, and *behavioural intention* demonstrates the integration of more complex frameworks. Practical applications are represented by keywords like *e-health* and *adoption*, showing how theory is being extended to real-world technological systems, especially in health and service contexts.

Blue Cluster – Trust, Risk, and Privacy Concerns in Technology Use:

Key Themes: Trust, risk, privacy, security, perceived trust, perceived security, information technology, covid-19, cloud computing, indonesia.

This cluster captures the psychological and environmental factors influencing technology acceptance, particularly those related to *trust*, *risk*, and *privacy*. These constructs are increasingly relevant in contexts involving personal or financial data exchange. *COVID-19* highlights the impact of global disruptions on user attitudes, while *cloud computing* and *information technology* suggest technical backdrops where such concerns are especially salient.

Yellow Cluster – Digital Finance, Banking, and Mobile Technologies:

Key Themes: Mobile banking, internet banking, mobile payment, online banking, m-banking, e-banking, fintech, perceived enjoyment, perceived value, self-efficacy, technology readiness, adoption intention.

This cluster reflects the application of TAM in the digital finance sector. The appearance of *fintech*, *mobile payment*, and various forms of digital banking indicates that researchers have applied

TAM to study trust, utility, and ease in online financial systems. *Self-efficacy*, *perceived enjoyment*, and *technology readiness* reflect deeper user-level psychological determinants of acceptance and continued usage.

Light Blue Cluster – Social Influence and Post-Adoption Factors:

Key Themes: Social influence, satisfaction, continuance intention, ease of use, personal innovativeness.

This cluster emphasizes the social and experiential aspects of technology usage. *Social influence* continues to be a strong determinant of intention, while *satisfaction* and *continuance intention* show increasing attention to post-adoption behaviors. *Personal innovativeness* indicates that personality traits are gaining ground in explaining variance in acceptance across individuals.

Orange Cluster – Behavioral Theory and Motivation:

Key Themes: Theory of planned behaviour, theory of reasoned action, perceived enjoyment, continuance intention, technology readiness, adoption intention.

This cluster brings together long-standing behavioral theories—*TPB* and *TRA*—with newer constructs that emphasize motivation and sustained engagement. *Perceived enjoyment* and *continuance intention* reflect the model's expansion into hedonic and long-term use domains. The link to *technology readiness* reinforces the connection between individual predispositions and behavioral outcomes.

This comprehensive map of keyword clusters highlights TAM's central role and adaptability across domains. The recurring presence of *technology acceptance model*, *perceived usefulness*, and *behavioural intention* emphasizes the model's theoretical continuity, while keywords such as *artificial intelligence*, *covid-19*, and *e-health* reflect the model's capacity to evolve with new technological and societal demands. This cluster analysis confirms TAM's flexibility in addressing acceptance in consumer behavior, finance, healthcare, education, and organizational innovation.

4. Discussion and Conclusion

This study offers a comprehensive bibliometric analysis of the Technology Acceptance Model (TAM) in the domains of business and marketing, covering publications indexed in the Scopus database between 2004 and 2024. By analyzing a total of 1234 peer-reviewed articles, this study reveals significant thematic trends and conceptual clusters based on keyword co-occurrence patterns. The findings show that while the foundational constructs of TAM—such as *perceived usefulness*, *perceived ease of use*, and *behavioral intention*—remain central across all periods, the application domains have expanded to include fields such as digital banking, e-commerce, e-health, artificial intelligence, and social media marketing. The temporal segmentation (2004–2011, 2012–2019, and 2020–2024) illustrates a shift from early adoption concerns toward more nuanced issues such as trust, privacy, and the integration of TAM with extended theoretical frameworks (e.g., UTAUT, TRA, TPB). The cluster analysis further highlights seven distinct thematic areas, suggesting a diversification and deepening of TAM research over the last two decades.

4.1. Theoretical Contributions

The study makes several theoretical contributions to the TAM literature. First, it offers a longitudinal perspective that captures how the model has evolved in response to technological, societal, and theoretical developments. Unlike prior meta-analyses that focus on specific contexts or constructs, this study maps the broader intellectual structure of TAM research using bibliometric methods. Second, by identifying emerging constructs such as *technology readiness*, *perceived risk*, *trust*, *continuance intention*, and *social influence*, the study underscores the model's flexibility and its capacity to integrate complementary psychological and behavioral theories.

Importantly, the findings reveal how TAM has been increasingly used in business – and marketing-oriented research to explore customer decision-making, digital channel adoption, and platform usage behavior. The model's integration with consumer behavior theories and strategic marketing constructs demonstrates its ability to bridge technology and business domains. Finally, the clustering of keywords provides evidence for the increasing integration of TAM with contemporary topics such as *artificial intelligence*, *fintech*, and *e-health*, indicating that TAM remains a robust and adaptable theoretical framework for understanding user interaction with technology in various socio-technical systems.

4.2. Practical Implications

This research also offers valuable insights for practitioners, particularly in marketing, business strategy, technology management, and digital transformation domains. The sustained prominence of user-centric variables—such as *perceived usefulness*, *perceived value*, and *user satisfaction*—suggests that organizations aiming to promote new technologies should prioritize intuitive design, functional relevance, and post-adoption support. The significance of *trust*, *risk perception*, and *security* highlights the need for digital platforms to address data protection concerns proactively.

In the field of marketing, TAM continues to guide the development of digital engagement strategies, helping firms optimize user experience, brand interactions, and conversion mechanisms across platforms such as *e-commerce*, *social media*, and *mobile applications*. In the broader business context, insights from TAM research can be used to align internal digital transformation efforts with employee readiness and stakeholder adoption patterns. The rise of application-specific terms like *mobile banking*, *digital services*, and *social commerce* implies that TAM-based models can inform platform-specific strategies, enabling more precise targeting, personalization, and adoption planning. Managers and policy-makers in technology-intensive sectors can utilize these findings to better align technological features with user expectations, cultural trends, and evolving market dynamics.

4.3. Limitations

Despite its wide scope, this study is not without limitations. First, the analysis is limited to publications indexed in the Scopus database and does not account for potentially relevant studies in other databases such as Web of Science, Google Scholar, or non-English sources. Second, the

keyword-based co-occurrence analysis depends on author-supplied metadata, which may omit significant conceptual content present in the full text. Additionally, the use of bibliometric methods, while suitable for mapping research trends, does not allow for in-depth content analysis of theoretical arguments or empirical findings. Finally, the reliance on predefined search terms (e.g., "Technology Acceptance Model") may have excluded studies that applied the model implicitly without explicitly mentioning it in their metadata.

4.4. Suggestions for Future Research

Future studies may build upon this analysis in several directions. First, comparative bibliometric analyses across other regions or databases (e.g., Web of Science, Dimensions) may uncover regional variations in TAM applications. Second, future research could explore sector-specific trends in TAM research, such as applications in healthcare, education, or public services, where user adoption behaviors differ significantly. Third, there is room for methodological expansion by combining bibliometric analysis with qualitative content analysis or systematic literature reviews to provide deeper theoretical insights. Finally, future work should also consider how evolving technologies—such as blockchain, augmented reality, and generative AI—may require revisiting and potentially revising existing acceptance models to maintain their explanatory power.

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Resume

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