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TAM VERSUS UTAUT MODELS: A CONTRASTING STUDY OF SCHOLARLY PRODUCTION AND ITS BIBLIOMETRIC ANALYSIS

LOS MODELOS TAM FRENTE A LOS UTAUT: ESTUDIO COMPARATIVO DE LA PRODUCCIÓN CIENTÍFICA Y ANÁLISIS BIBIOMÉTRICO

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KEYWORDS

Models and frameworks in Technology Adoption
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Visualization map
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ABSTRACT

The objective of this research is to review and compare the TAM/TAM2/TAM3 and the UTAUT/UTAUT2 through a bibliometric approach to determine which is the most appropriate model to study new technologies. Data was obtained from the Web of Science database. 2,450 publications were examined, related to TAM/TAM2/TAM3 and 5,145 publications of UTAUT/UTAUT2 during the period 2016-2021. The findings confirm that UTAUT/UTAUT2 is being used by more and more researchers. This review offers a holistic view that will help future researchers to select the most appropriate models in their disciplines of study.

PALABRAS CLAVE

Modelos de Aceptación Tecnológica
Análisis Bibliométrico
TAM
UTAUT 2
Web of Science (WoS)
Mapa de visualización
VOSviewer

RESUMEN

El objetivo de esta investigación es revisar y comparar a través de un enfoque bibliométrico la TAM/TAM2/TAM3 y la UTAUT/UTAUT2 para determinar cuál es el modelo más adecuado para estudiar las nuevas tecnologías. Los datos se obtuvieron de la base de datos Web of Science. Se examinaron 2.450 publicaciones, relacionadas con TAM/TAM2/TAM3 y 5.145 publicaciones de la UTAUT/UTAUT2 durante el período 2016-2021. Los hallazgos confirman que cada vez más investigadores utilizan la UTAUT/UTAUT2. Esta revisión ofrece una visión holística que servirá para que futuros investigadores puedan seleccionar los modelos más apropiados en sus disciplinas de estudio.

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Introduction

Technology Adoption as a phenomenon has been studied via several models and theoretical filters in order to explore the enviroment around technology acceptance and its use. Some of the approaches were focused in the process, by looking in detph into adoption; other approaches applied existing theories around behavioralism or were created for the sole purpose of narrowing down adoption as a single event. These theories encompassed a extended model and framework overtime: TAM (Davis, 1989), updated TAM2 (Venkatesh & Davis, 2000) and TAM3 (Venkatesh & Bala, 2008); UTAUT (Venkatesh et al., 2003), updated UTAUT2 (Venkatesh et al., 2012).

As part of theories and explanatory models, these working theories will provide a set of variables for defining a specific phenomenon, versus a framework model that accounts for a system, theory and phenomena, by describing known properties or infered characteristics to be used in studies thereof. Aditionally, a model applies to any abstract representation extracted from a segment of the real world, presented with the purpose of explaining, undertanding, predicting and controlling any phenomena in the light of investigation (Burch, 2003).

According to TAM (Davis, 1989) behaviroual intention is determining human behaviour in base to the emotional component, guiding attitude towards a specific behaviour. This cognitive approach into the conditining factors of behaviour led into variables in usage that are induced from its utility perceived and easy of use, as relating to external factors, such as beliefs, attitudes linked to intention (Davis et al., 1989). TAM is athe basic model that will be undertook by Venkatesh & Davis (2000), for an extended framework TAM2, which integrates variables from a social and oraganizational onset. The third upgrade into an extended and encompassing framework of this model TAM3 (Venkatesh & Bala, 2008) goes into a set of precedents to factor in the easy of use as perceived within a community, as well as, its perceived enjoyment and usability.

UTAUT (Venkatesh et al. 2003) is an extended theoretical approached that has been validated in different areas with the aim of approaching factors determining behavioral intention within organizations fro the use of technology. It aligns with at least eight previous theories that were mainstream in order to explain any technological related factor within a specific time-frame, by means of identifying 32 constructs that provided a set of four variables: *Performance expectation*, *Effort Expectation*, *Social Influences* and *Facilitating Conditions*, as main variables to predict user intention and behaviroul use. In order to adapt this theory to end-user, UTAUT2 added three constructs for analysis: *Hedonic Motivation*, *Price-value* and *Habit* (Venkatesh et al., 2012).

These theories present a robust model that is reliable and it had been consistently applied in looking for the factors impacting behaviour and usage for technology around varied enviroments:

- TAM/TAM2/TAM3: mobile / e-payments (Zhong & Moon, 2021); mobile / e-learning (Alfadda & Mahdi, 2021); health (Rajak & Shaw, 2021), artificial intelligence (Iqbal & Sidhu, 2022), mobile platforms (Song, et al., 2021) etc.
- UTAUT/UTAUT2: mobile / e-payments (Suo et al., 2022); mobile / e-learning (Alghaziet al., 2021); health (Arfi et al., 2021), artificial intelligence (Balakrishnan et al., 2022), mobile aplications (Puriwat & Tripopsakul, 2021) etc.

This bibliometric approach to the analysis of variables incresed over the years due to accesibilty and readily avalaible software for contrasting data, providing a scientific range for great volumen of data, and leading into high impact research (Donthu et al., 2021).

2. Objetives

We are taking into consideration that new technology is subject to constant evolution, in order to explain its use from a user perspective side. This area remains a niche with current updates being brought up to light by scholars and research community. With this botton line, an approach to technology adoption is accountable to biometric standards taken from indexed resources in Web of Science, via main reviews and journals to describe, explain and assess the models TAM/TAM2/TAM3 y UTAUT/UTAUT2. Some of the questions and objectives that will be tackled, are listed in advance:

- Which similarities and differences in quantity, quality and structure are relevant to scientific approaches from the angle of TAM and UTAUT, including all the extensions in the frameworks (TAM2/TAM3 & UTAUT2)?
- What are the main areas for investigation within the scientific community?
- Which theoretical approach and models are presently most relevant and have a wider acceptance to provide a model that underlies to rejection theory or adoption in technology?

In order to provide answers, the path of inquire will set around these objectives:

- To identify, visualize and contrast scholarly published articles to account for research standards of quantity, quality, and structure by presenting an analisys and main ratios:
    - Research Areas, Publisher, Journal, Document Type and Language.
    - Using PRICE model in order to analyze behavior within production in areas of research specific to adoption that evaluate any growing rate for its own trends of analysis.

- Identifying LOTKA'S law and authors with a high index ration in order to establish guidelines across the discipline for those authors transitioning or non-specialized/
- Identifying BRATFORDS'S model for those articles and studies that are central and relevant to several technology disciplines.
- Providing analysis for quotations, authors and journals highlighted.
- By collaborating authors as part of the VoS viewer tool.
- Identifying key terms in VoS viewer within articles and content provided for analysis, in order to offer a thematic approach to research trends that is organized guiding a scholarly approach.

3. Critical studies overview

In this section, the focus will be on the models and theories that underline the study, taking into consideration the proposed model for assesment.

3.1. Technology Adoption models (TAM/TAM2/TAM3)

The *Technology Acceptance Model* (TAM) was the first model to mention psychological factors that affect the technology adoption, and it was developed by Davis, in 1989, departing from the *Theory of Reasoned Action* (TRA) and *Theory of Planned Behavior* (TPB). TAM analyzes user behavior taking their attitudes as a key variable, in order to predict and explain the use of technology and analyze why people accept information systems or not. This model indicates that the user's motivation to select a techology system depends on three factors: *perceived ease of use*, *perceived usefulness*, and attitude, a factor that is considered essential as determinant in predicting whether the user will utilize it or not. *Perceived usefulness* and *ease of use* are specified as the main factors affecting attitude, which is connected to relationships between beliefs, attitudes, intention and behavior. All other external factors are assumed to influence intention and attitude indirectly, through *perceived usefulness* and *ease of use*. For this reason, an individuals' actual behavior is conditioned by behavioral intention, which is determined by attitude and subjective norms, and, in turn, conected to core beliefs and other external factors. *Perceived usefulness* is the individual's belief about how a particular system will improve their performance on a task, while *perceived ease of use* is the extent to which the user believes that using that technology will be effortless. In this way, *perceived usefulness* and *perceived ease of use* constitute cognitive determinants of behavioral intention, while attitude represents the affective component (Davis et al., 1989).

The model TAM2 (Venkatesh & Davis, 2000) incorporates two groups of constructions into the original set: *social influences* (image and subjective norms) and *cognitive influences* (the relevance of the task, the quality of the result and the possibility of demonstrating the result); There are two added moderating factors: *experience* and *willingness of use*. Subjective norms influence not only the *perceived usefulness* but, also, the *intention to use*.

The model TAM3 (Venkatesh & Bala, 2008) incorporates a set of antecedents for the perceived *ease of use*: *self-efficacy*, *anxiety*, "*playfulness1*", as well as, those user associations to a external control. Additionally, the authors propose two factors interrelated with the system in itself: *perceived enjoyment* and *perceived usability*.

3.2. Unified Theory of Aceptance and Use of Technology (UTAUT) and extension Theory (UTAUT2)

The *Unified Theory of Acceptance and Use of Technology* UTAUT (Venkatesh et al., 2003) was developed to analyze, collect and synthesize various prevalent technology adoption theories, through a review of eight of the most outstanding theoretical models: the *Innovation Diffusion Theory* (IDT) (Rogers, 1961); *Reasoned Action Theory* (TRA) (Ajzen & Fishbein, 1980); *Planned Behavior Theory* (TPB) (Azjen, 1991), *Social Cognitive Theory* (SCT) (Bandura, 1986), *Technology Adoption Model* (TAM) (Davis, 1989); *PC utilization model* (MPCU) (Thompson et al., 1991); *Motivational Model* (MM) and the *Combination TAM and TPB* (C- TAM- TPB) (Taylor & Todd, 1995). There are thirty-two constructs standing to the essential model, reviewed from a a unified perspective, via a *Unified Theory of Acceptance and Use of Technology* (UTAUT) (Venkatesh et al., 2003), with the aim of explaining behavior from an organizational side accounting for technology use and adoption. The four main constructs defined as part of the extended, unified, model are: *Performance Expectation*, which is the degree to which the use of a technology will provide benefits to users in carrying out certain activities; *Effort Expectation*, which is the degree of ease associated with the use of the system; *Social Influence*, which is the measure that users perceive that other notable and relevant users in the community (for example, family members, friends, or colleagues) believe in their use of any given technology; *Facilitating conditions*, which are the users' perceptions of resources and the support available to perform a behavior. Last, there are four moderators to contrast the analysis: age, gender, experience and willingness of use. Venkatesh et al., (2012), add three newly introduced factors that further describe the context of the consumer, *Hedonic Motivation* that is the fun or pleasure derived from the use of technology, *price-value* that is the cognitive compensation of consumers between the perceived benefits of applications and the cost

of using them, and *habit*, which is the extent to which individuals tend to perform behaviors automatically due to learning.

3.3. Bibliometrics

The growing number of reviews in research literature produced in recent years is linked with analysis and bibliometric standars for establishing data pools within the scholar community. Quantitative methods are based in perfomance indicators and mathematical models, that allow, in one hand, to examine the material from a retrospective point of view and provide an advancement aligned with research progression; in the other hand, it allows evaluating the potential for a given theme in featuring a line of development that is productive for research or whether is obsolete (White & McCain, 1989).

Known assesments for analysis and a bibliometric approach are contrasting production analysis versus structure models. Quantity and quality indexes examining contributions in a specific field (Cobo et al., 2011) are descriptive and mainly based on bibliometrics. The second type of assesments contribute with a scientific-base, mapping the connections within the levelers in the data-set; and, these are more likely to be structural (Donthu et al., 2020).

Quantity indicators are measuring productivity around terms and keywords measured to an autor, journal or institution (Durieux & Gevenois, 2010; Tan et al., 2009).

Quality indicators are most commonly used to measure the frequency of citations linking a platform, author and periodical journal, as these appear in other platforms (Durieux & Gevenois, 2010).

Structural indicators measuring the links brigdging publishing areas, authors and knowledge data-bases, are associated with analysis and with constructionism in social networks, known as *sociograms* (Rueda et al., 2007).

Many areas of study and fields interelated via bibliometric analysis are based in TAM/TAM2/TAM3/UTAUT/UTAUT2; these trace down patterns in knowldedge areas (Alturas, 2021; Al-Emran & Granić, 2021; Taneja & Bharti, 2021; Wang et al., 2021; Xu et al., 2021).

4. Methodology

The methodology carried out was developed in three stages, after scrutinizing data-bases: first, data collection; second, processing via analitic units; and, third, data-visualization for analysis by providing maps. The program IBM SPPS Statistics 27 was used to perform the descriptive analysis, count the frequency of citations and keywords, and, generate the citation matrix (journals/documents/authors), as well as, a matrix of keyword co-occurrences using the VoS viewer software (Van Eck and Waltman, 2010).

4.1. Selection and data analysis

In order to obtain quality data, Web of Science (WOS) is a recognized database, akcnowledged by the scientific community as a digital platform for indexed literature and bibliometrics, which provides metadata for standard analysis. (Gaviria-Marin et al., 2019). Since it covers a wide range of disciplines, metadata will yield a high-quality range of information for any analitical undertake.

The parameters applied to article searches are described below:

1. TAM: Web of Science Core Collection; topic: Technology Adoption Model; open access Timespan: 2016-2021 (March, 12); Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI, CCR-EXPANDED, 2.
2. UTAUT/UTAUT2: Web of Science Core Collection; topic: utaut2 OR utaut 2 OR extending unified theory acceptance use of technology, or unified theory acceptance use of technology, or theory acceptance and use of technology. Timespan: 2016-2021 (March, 12); Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI, CCR-EXPANDED, 2.

Two different data sets were created:

1. TAM/TAM2/TAM3 research article bibliographic records. As a result, a total of 2,450 documents were included in this data set;
2. UTAUT/UTAUT2 bibliographic records with a data set of 5,145 documents.

The retrieved documents were downloaded in plain text format and analyzed well along.

4.2. Selection and units for processing analysis

After obtaining citation sources of documents, authors and journals, the units basis for citation analysis were: sources cited, references cited, and authors cited, while the units for basis in co-occurrences for the analysis, were the keywords provided by the authors of the documents.

Basis for analysis. The keywords, and descriptors, with which the scientific production is indexed were chosen from the retrieved documents. The first database, researched data, included records from two types of keywords: a) Author keywords (AKW), provided by the authors themselves; and b) Keywords Plus (KW+), automatically extracted by WoS from the frequency of appearance of the words in the titles of the references of the cited articles.

The automatically extracted keywords are less specific and understandable than the words provided by the authors for keytags (Zhang et al., 2016). For the purpose of our study, the AKW's selected were provided by the authors.

4.3. Map Visualizations of units and processing

The bibliometric software used is VoSviewer (Van Eck & Waltman, 2010). Through the visualization of distance-based bibliometric networks, thousands of nodes are taken to perform the analysis of imported data. This tool works, on the one hand, with different units of analysis, such as authors, organizations, countries, documents, journals, keywords, and citations, and, on the other hand, with units of measurement, such as co-authorship, co-ocurrences, citations, and co-citations. The maps are elaborated following these three techniques:

1) the *association strength* normalization technique consists in measuring the similarity of the co-citation and co-occurrence values of the analyzed units, considering s*trength of association* (FA) in the similarity index, shaping a matrix of normalized co-occurrences. The FA index is based on the normalization of the intensity for pairs of units associated in the analysis; the weight of each co-citation, and the co-occurrence of keywords, were obtained according with this mapping method (Van Eck & Waltman, 2010).

2) The *visualization of similarities,* VoS mapping technique, consists in executing different clustering algorithms to position and classify the co-citations of journals, documents and authors; the co-occurrences of keywords, in similar groups yields a cluster, which is a set of closely related nodes aligned to a type of link. Each node being analyzed is assigned to a cluster (Van Eck & Waltman, 2010).

3) the *grouping technique* consists in representing the different groups in tags; a map for visualizing different units where represented areas using circles, nodes, and labels, are connected by links or lines. The size of the nodes in the co-citation analysis represents the normalized number of citations received for each item, and the thickness of the lines represents the strength of the links. The link and the proximity between two items identify the relationship of citation, or co-occurrence in this method, between two units of analysis. The color of the nodes is random and it indicates the group with which each item is associated (Van Eck & Waltman, 2010).

4.4. Bibliometrics

With the acceptance of bibliometrics as a science-base discipline, the legal side evolved to show the progression and elaborate laws that protect the handling of privacy, confidentiality, etc. As relating to data and information. The search for statistically regular behaviors over time in the different elements related to the production and consumption of scientific information, as well as global explanations for the observed phenomena, are achieved through the formulation of bibliometric laws. Three primary laws to be known and pertinent in this research are the laws of Price, Lotka, and Batford.

4.4.1. Price Law: the law of exponential growth in scientific information

Price's Law models the relationship between production and time. Price found that the growth of scientific information was exponential and occurred at such a rapid rate that every 10-15 years the existing global information doubled (Price, 1963).

4.4.2. Lotka's law: the law of productivity in scientific authors

Lotka's law is the non-linear regression model that relates the number of authors to their productivity: "The number of authors, An, who publish n papers on a subject is inversely proportional to the number of articles squared". This premise stated that a small number of authors concentrate the largest volume of scientific production, specialized authors who lead scientific production and the rest, which represents the vast majority of authors, have low productivity, since they are researchers in passing or transient condition (Lotka, 1926).

4.4.3. Bradford's law: the law of dispersion in scientific literature

Bradford's Law of Dispersion establishes that

> *if scientific journals are ordered in a decreasing sequence of productivity of articles on a specific field, they can be divided into a nucleus of journals that deal in particular with the subject, a Bradford nucleus, and various groups or zones containing approximately the same number of articles as the core, where the number of journals in the core and in successive zones is in a 1: n: n2 ratio*. (Bradford, 1934)

5. Results

5.1. Quantity levelers

The contributions of the research components in a set field are examined: authors, institutions, countries, languages, journals, among others. This quantity-based analysis, which is descriptive in nature, is the hallmark of bibliometric studies (Donthu et al., 2020).

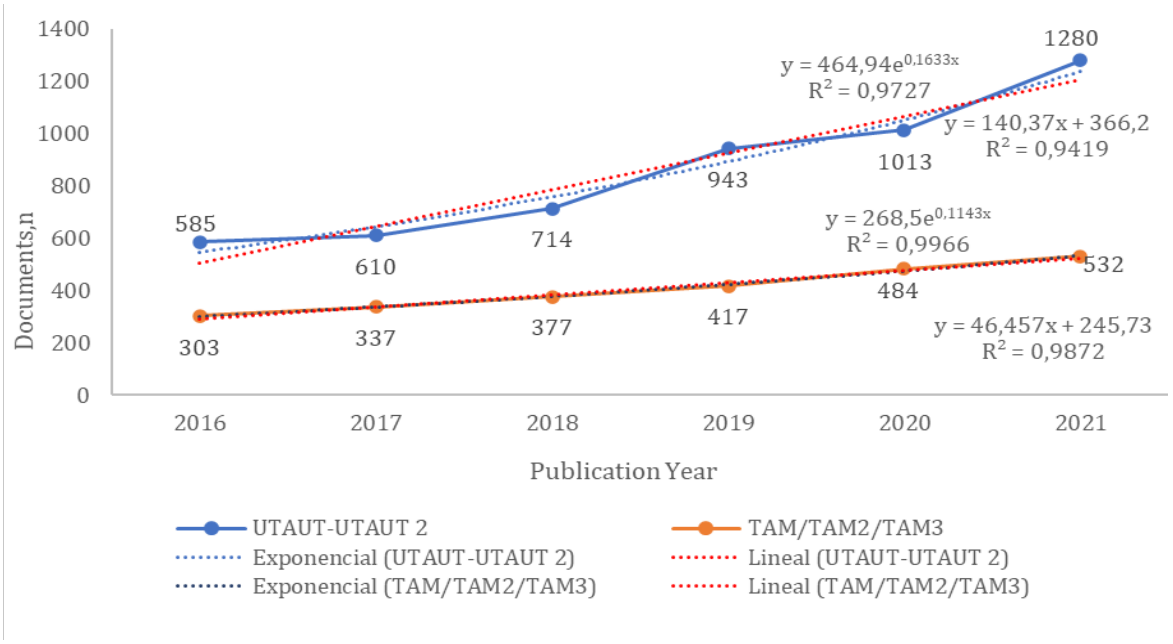
5.1.1. Amount of publications by year

The dissemination of research papers over set periods of time reveals the pace of development of a specific field (Donthu et al., 2021a). The state of scientific development derives to obsolescence of scientific literatura over time. In other words, there is a strong tendency in many disciplines for scientific publications to stop being researched relatively quickly, since in areas with a high level of production, the documents are replaced by others with newer information, in other cases, the information is valid, but there is a decreasing interest in these fields of knowledge. Each discipline undergoes its own evolution, passing through various stages: first, precursors, that would be the first publications in a field of research; second, exponential growth when a field becomes a research front; last, a linear growth that is the moment that it slows down publications and its primary purpose is to review and archive knowledge (Ardanuy, 2012).

A total of 2,450 records were retrieved for the TAM/TAM2/TAM3 search, while 5,145 records were retrieved for the UTAUT/UTAUT 2 search for the period 2016-2021. Graph 1 shows the growth of articles through Price's Law to model the relationship between production and time. In the case of the TAM/TAM2/TAM3, the correlation index R^2 = 0.9727 obtained means that 0.027% of the variance is not explained in the exponential fit, compared to 0.058% not explained in the linear fit. According to the curve, the theories continue to be a front of scientific interest since it continues in a growth stage by having an exponential growth. In the case of UTAUT/UTAUT2, the correlation index R^2 = 0.9966 obtained assumes that 0.003% of the variance is not explained in the exponential fit, compared to 0.013% not explained in the linear fit. Observing the curve and the value of the indexes, the current growth would be exponential, so it continues in the growth stage, being a set of theories of interest within the scientific community. The regression line confirms that the growth pattern is consistent along the line, in both fields of investigation.

As shown in the graphic below, the growth of articles using these theories has been steadily increasing over the years. Although the research articles linked to a second search, UTAUT/UTAUT2, grew at a faster pace than the first one, TAM/TAM2/TAM3.

Graphic visualization 1. – Rate of growth in production (Price's model)



Source: Garcia de Blanes et al., 2022

5.1.2. Amount of publications by author

Upon distributing the documents by the number of authors, it was observed that in the 2,450 documents of TAM/TAM2/TAM3, there are a total of 6,584 authors, a number of authors that is quite high compared to the total number of works produced, which makes an average of 2.69 articles/author. Of these 6,584 authors, 5,879 authors have produced a single document; 678 authors two documents, and 27 authors => 3 documents. In the UTAUT/UTAUT2, there are a total of 12,889 authors; this number of authors is quite high compared to the total number of works produced 5,145, which makes an average of 2.51 authors/article. Of these authors, 10,954 authors have produced a single document; 1,844 authors two documents and 91 authors => 3 documents.

Next, it is observed and shown in table 1, the 6 most productive authors in TAM/TAM2/TAM3: Al-emran M with 23; Al-rahmi WM with 17 and Salloum SA with 15 documents; in the UTAUT/UTAUT2 area: Dwivedi YK with 38, Rana NP with 35 and Oliveira T with 33 documents.

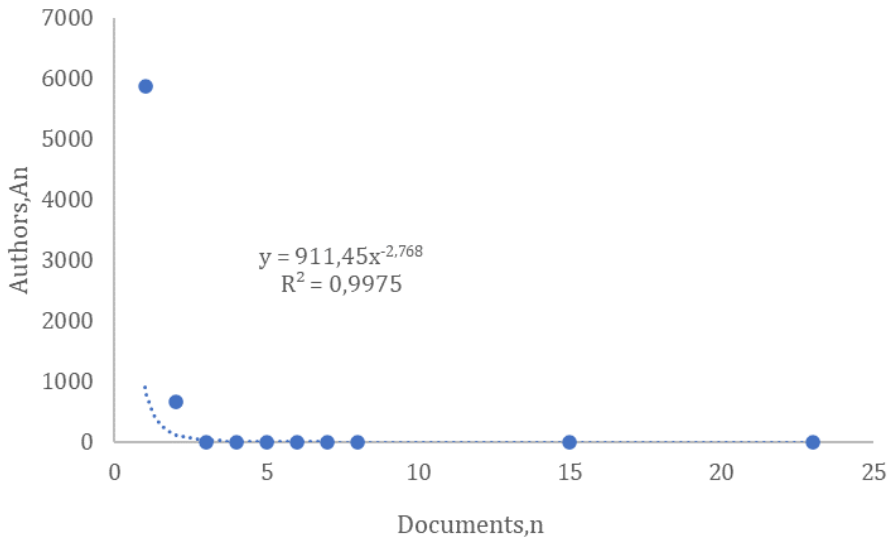
Table 1. Top Autores

TAM/TAM2/TAM3			UTAUT-UTAUT 2		
Authors	**Record Count**	**% Total**	**Authors**	**Record Count**	**% Total**
Al-emran M	23	0,9%	Dwivedi YK	38	0,7%
Al-rahmi WM	17	0,7%	Rana NP	35	0,7%
Salloum SA	15	0,6%	Oliveira T	33	0,6%
Teo T	15	0,6%	Al-rahmi WM	21	0,4%
Garcia-penalvo FJ	12	0,5%	Chatterjee S	17	0,3%
Mensah IK	11	0,4%	Kim S	17	0,3%
		3,80%			**3,13%**

Source: Garcia de Blanes et al., 2022

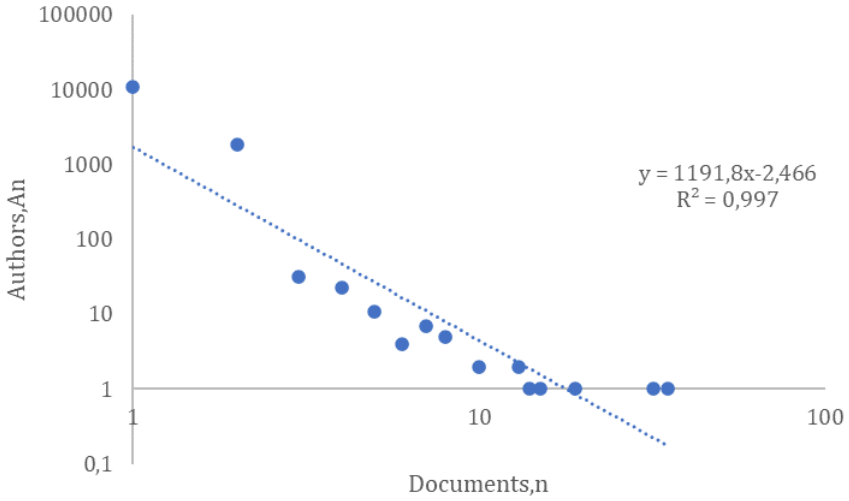
The productivity of the authors is going to be measured through Lotka's law. From the analysis in TAM/TAM2/TAM3, graph. 2 displays the coefficient of determination is R2 = 99.75%; in UTAUT/UTAUT2 the coefficient of R2 = 99.7% (see graph 3). Therefore, Lotka's Law is fulfilled. This great dispersion of the field can be explained either by the multidisciplinary approaches, or by the possibility of applying this model to different contexts.

Graphic 2. Productivity within authors TAM/TAM1/TAM2 (Lotka's law)



Source: Garcia de Blanes et al., 2022

Graphic 3. Productivity within authors UTAUT/UTAUT2 (Lotka's law)



Source: Garcia de Blanes et al., 2022

5.1.3. Amount of publications by journal and publisher

In both cases of study, appear the same five main publishers but table 2 pointed at the different order by varying status. These publishers account for 56.07% of the publications in TAM/TAM2/TAM3 and 61.87% in UTAUT-UTAUT 2. The publisher with the largest number of publications, Elsevier, has a 12.08% (294 documents) of the total publications in TAM/TAM2/TAM3, and in the case of UTAUT-UTAUT2, a 17.24% (887 documents) over all publications. The Dutch publisher Elsevier, one of the largest scientific publishers in the world, features products such as the *Lancet,* the *Cell* journals in the ScienceDirect collection of electronic journals and the Scopus Citation Database.

Some journals published substantially more articles on topics related to the theories than others. For instance, the chart below (table 3) shows the 6 main journals with the largest number of articles on TAM/TAM2/TAM3 and UTAUT-UTAUT 2. The number of articles and the total percentage of production are shown as well. The journal with the most publications on both theories is the *Journal of Sustainability*, in the *Open Access Interdisciplinary* journal, published by MDPI.

Table 2. Top Publishing organizations

TAM/TAM2/TAM3			UTAUT-UTAUT 2		
Publisher	# Documents	% total	Publishers	# Documents	% total
Elsevier	296	12,08%	Elsevier	887	17,24%
IEEE	255	10,40%	Emerald Group Publishing	665	12,93%
Springer Nature	249	10,16%	Springer Nature	570	11,08%
Emerald Group Publishing	212	8,65%	Taylor & Francis	447	8,69%
Taylor & Francis	194	7,92%	IEEE	342	6,65%
Mdpi	168	6,86%	Mdpi	272	5,29%
		56,07%			61,87%

Source: Garcia de Blanes et al., 2022

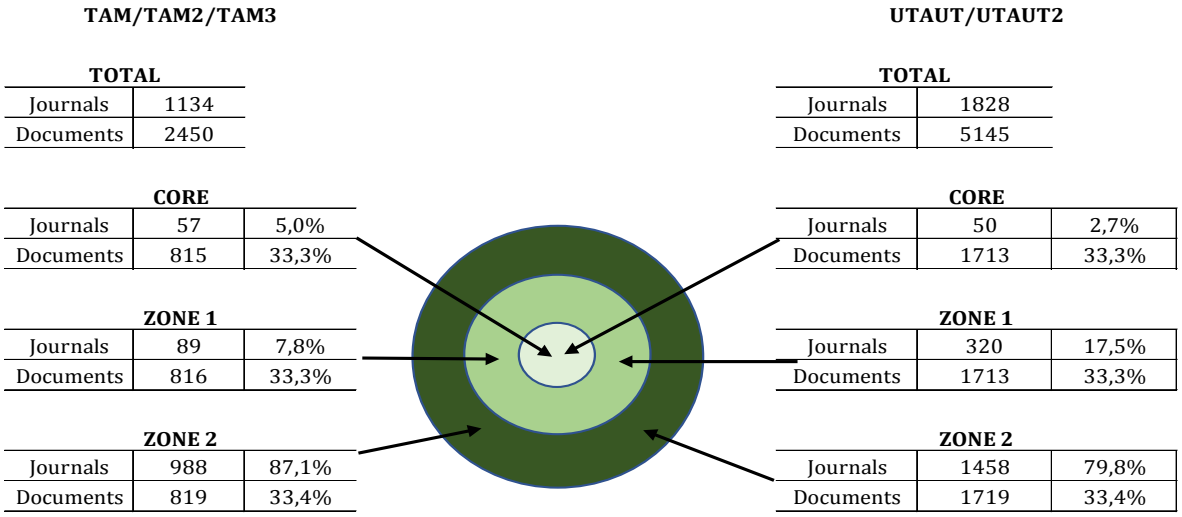
Table 3. Top Journals

TAM/TAM2/TAM3			UTAUT-UTAUT 2		
Publisher	# Documents	% total	Publishers	# Documents	% total
SUSTAINABILITY	81	3,3%	SUSTAINABILITY	135	2,6%
EDUCATION AND INFORMATION TECHNOLOGIES	53	2,2%	COMPUTERS IN HUMAN BEHAVIOR	112	2,2%
COMPUTERS IN HUMAN BEHAVIOR	46	1,9%	INTERNATIONAL JOURNAL OF INFORMATION MANAGEMENT	62	1,2%
IEEE ACCESS	32	1,3%	EDUCATION AND INFORMATION TECHNOLOGIES	62	1,2%
JOURNAL OF ASIAN FINANCE ECONOMICS AND BUSINESS	23	0,9%	BEHAVIOUR & INFORMATION TECHNOLOGY	55	1,1%
INTERACTIVE LEARNING ENVIRONMENTS	23	0,9%	JOURNAL OF MEDICAL INTERNET RESEARCH	47	1,0%
		10,5%			10,2%

Source: Garcia de Blanes et al., 2022

Next, the dispersion of production by journals is shown in Figure 1. For this analysis, the first set, TAM/TAM2/TAM3, results in 57 journals core to Bradford's method showing those authors with highest concentration of publications by having the largest number of publications. In the UTAUT/UTAUT2 set, the core is made up of 50 journals. In both cases, the Bradford Mathematical Model of production dispersion is fulfilled.

Figure 1: Dispersion of production (Bradford model)



Source: Garcia de Blanes et al., 2022

5.1.4. Amount of publications by countries

When performing the analysis by country, as shown in Table 4, in the case of TAM/TAM2/TAM3, Peoples R. CHINA is the country with the highest production with 354 documents (10.8%), and, in UTAUT/UTAU2, it is USA with 853 documents (11.6%). In the case of TAM/TAM2/TAM3, in descending order, the contribution by country would be: USA, Malaysia, Taiwan, and Indonesia. In UTAUT/UTAUT2: Peoples R. China, Malasya, Taiwan, and Great Britain.

Next, by applying a regional filter to look into geographical regions, results highligh Asia (China / Malasya / Taiwan / Indonesia) as the area with the highest production, since it represents 28.3% with 926 documents for the TAM/TAM2/TAM 3 search, and 21.3% with 1,560 documents in UTAUT/UTAUT2.

Table 4. Top publicacions by country

TAM/TAM2/TAM3			UTAUT-UTAUT 2		
Countries/Regions	Record Count	% of Total	Countries/Regions	Record Count	% of Total
PEOPLES R. CHINA	354	10,8%	USA	853	11,6%
USA	250	7,6%	PEOPLES R. CHINA	786	10,7%
MALAYSIA	233	7,1%	MALAYSIA	423	5,8%
TAIWAN	176	5,4%	TAIWAN	351	4,8%
INDONESIA	163	5,0%	ENGLAND	332	4,5%
		35,97%			37,40%

Source: Garcia de Blanes et al., 2022

5.1.5. Amount of publicacions by language

The most used language of publication for scientific dissemination is *English*, in the case of TAM/TAM2/TAM3 with 97.31% (2,384 of the documents); in the case of UTAUT /UTAUT2 a 98.40% (5,061 of the documents). In both cases, *Spanish* is second language, with *Portuguese* and *Chinese-Mandarin* third language of production, in both cases TAM/TAM2/TAM3 and UTAUT-UTAUT2, respectively.

Table 5. Top publicacions by language

TAM/TAM2/TAM3			UTAUT-UTAUT 2		
Language	Record Count	% of total	Language	Record Count	% of total
English	2.384	97,3%	English	5.061	98,4%
Spanish	31	1,3%	Spanish	28	0,5%
Portuguese	14	0,6%	Chinese-Mandarin	13	0,3%

Source: Garcia de Blanes et al., 2022

5.1.6. Amount of publications by entry format

The most frequent type of document presents the studies in the form of articles for periodical publications: in the TAM/TAM2/TAM3 search area, a total of 4081 documents, and UTAUT_UTAUT2 documented with 1820 items (table 6). The second most followed document, by far, is “Papers” or presentations from Cogress Proceedings.

Table 6. Top Publications by format

TAM/TAM2/TAM3			UTAUT-UTAUT 2		
Document Types	Record Count	% total	Document Types	Record Count	% total
Articles	4081	73,62%	Articles	1820	71,50%
Proceedings Papers	894	16,13%	Proceedings Papers	574	22,60%
Early Access	253	4,56%	Early Access	78	3,10%
Review Articles	174	3,14%	Review Articles	58	2,30%
		97,45%			99,50%

Source: Garcia de Blanes et al., 2022

5.1.7. Amount of publications by institution

From an institutional level, the organizations with the highest number of publications, as shown in Table 7, are the the UNIVERSITI TEKNOLOGI MALAYSIA, one of the main public research universities in Malaysia, with 45 publications in the TAM/TAM1/TAM2; in the UTAUT-UTAUT 2 the LEAGUE OF EUROPEAN RESEARCH

UNIVERSITIES LERU gathers 96 publications from an association formed by twenty-three research-intensive universities.

Table 7. Top Instituciones

Affiliations	Record Count	% total	Affiliations	Record Count	% total
UNIVERSITI TEKNOLOGI MALAYSIA	45	1,8%	LEAGUE OF EUROPEAN RESEARCH UNIVERSITIES LERU	96	1,9%
UNIVERSITAS BINA NUSANTARA	28	1,1%	STATE UNIVERSITY SYSTEM OF FLORIDA	71	1,4%
UNIVERSITI SAINS MALAYSIA	27	1,1%	UNIVERSITI TEKNOLOGI MALAYSIA	66	1,3%
LEAGUE OF EUROPEAN RESEARCH UNIVERSITIES LERU	26	1,1%	CHINESE ACADEMY OF SCIENCES	54	1,1%
KING SAUD UNIVERSITY	24	1,0%	UNIVERSITI SAINS MALAYSIA	53	1,0%
EGYPTIAN KNOWLEDGE BANK EKB	23	0,9%	UNIVERSITI MALAYA	51	1,0%
		7,06%			7,60%

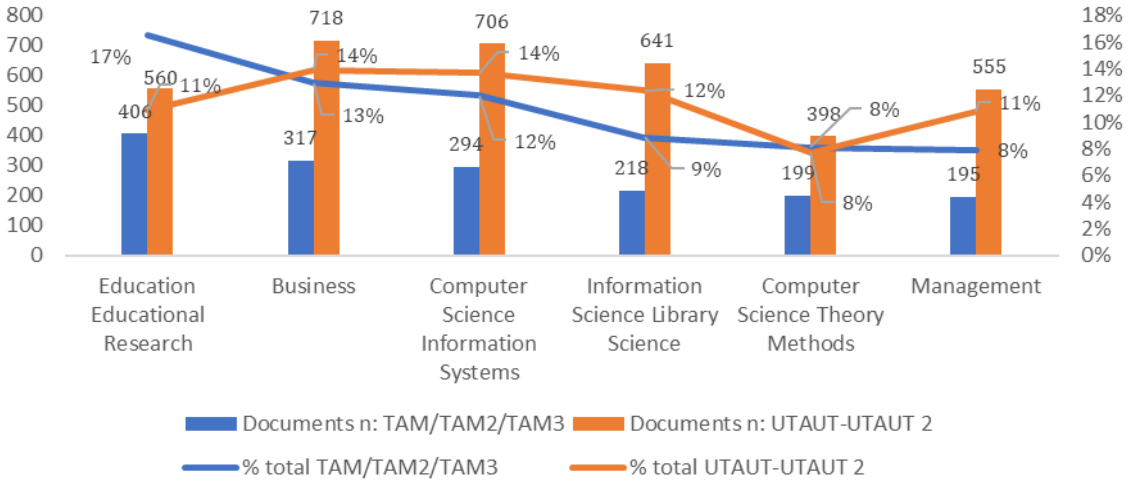
Source: Garcia de Blanes et al., 2022

5.1.8. Amount of publications by category

The scientific production as filtered by research area or discipline is shown next (Graph 4). In TAM/TAM2/TAM3, the category with the highest production is Education; Educational research presents a 17% with 406 documents. Other categories in descending order are: Computer Science Information Systems 12% (294 documents), Information Science Library Science 9% (218 documents), Computer Science Theory Methods 8% (199 documents), and Management 11% (195 documents).

In the second area of search, UTAUT/UTAUT2, the categories varied with the highest production in Business with 14% (718 documents), Computer Science Information Systems with 14% (706 documents), Information Science Library Science with 12% (641 documents), Education Educational Research with 11% (560 documents), Management with 11% (555 documents), and Computer Science Theory Methods with 8% (398 documents).

Graphic visualization 4- Top 6 theme-areas



Source: Garcia de Blanes et al., 2022

5.2. Quality markers

Research citations on both set of theories were compared to gain insight into the different types of research being conducted. As it is shown next (in table 8) the descriptive statistics of the citations points to a large number of

citations, which is indicative of the relevance of both research domains. The number of citations and means of productions is much higher in UTAUT/UTAUT2 than in TAM/TAM2/TAM3.

Table 8. #References

TAM/TAM2/TAM3			UTAUT-UTAUT 2		
References	# documentos	Media / citations	references	Record Count	% of Total
25,138	2,450	10,2	345,100	5,145	67,07

Source: Garcia de Blanes et al., 2022

5.2.1. Amount of author references

The most cited authors out of 10 in the higher rank, are: Mostafa Al-emran who received the highest citation count (458 citations), with Timothy Teo having the highest average citation count (75.3) in TAM/TAM2/TAM3. In the UTAUT-UTAUT2 areas, Yogesh k. Dwivedi, who received the highest citation count (2,135 citations), along with Marc Clement, with the highest citation average (204).

Table 9. Top referenced authors

Model	Author	Documents	Citation	Media / Citation
TAM/TAM2/TAM3	al-emran, mostafa	23	458	19,9
	tarhini, ali	4	301	75,3
	teo, timothy	15	249	16,6
	garcia-penalvo, francisco j.	8	229	28,6
	carlos sanchez-prieto, jose	7	227	32,4
	sharma, sujeet kumar	4	223	55,8
	olmos-miguelanez, susana	5	222	44,4
	salloum, said a.	15	184	12,3
	mezhuyev, vitaliy	5	183	36,6
	kamaludin, adzhar	3	167	55,7
	Total	89	2443	
UTAUT-UTAUT2	dwivedi, yogesh k.	35	2.135	61,0
	rana, nripendra p.	32	2.070	64,7
	alalwan, ali abdallah	13	1.108	85,2
	williams, michael d.	8	976	122,0
	tarhini, ali	13	646	49,7
	clement, marc	3	612	204,0
	al-rahmi, waleed mugahed	19	450	23,7
	wamba, samuel fosso	10	424	42,4
	lal, banita	3	415	138,3
	jeyaraj, anand	4	407	101,8
	Total	140	9243	

Source: Garcia de Blanes et al., 2022

5.2.2. Amount of Journal references

Considering the top 10 journals with the highest number of citations, *Computers in Human Behavior*, with 3,298 citations within TAM/TAM2/TAM3, is the journal with the highest number of citations although it is not the highest in terms of average, occupying fourth place in the top 10 citations. As for UTAUT/UTAUT2, it is the journal *Sustainability* with 10,505 citations that has the highest number of citations, lowering in the average index to rank eighth in the top 10.

Table 10. Top Referenced Journals

	Journal	# Documents	#Citations	Average Citations
TAM/TAM2/TAM3	COMPUTERS IN HUMAN BEHAVIOR	46	3,298	71,7
	INTERNATIONAL JOURNAL OF INFORMATION MANAGEMENT	11	822	74,7
	COMPUTERS & EDUCATION	11	811	73,7
	SUSTAINABILITY	81	700	8,6
	TELEMATICS AND INFORMATICS	18	601	33,4
	JOURNAL OF RETAILING AND CONSUMER SERVICES	17	543	31,9
	IEEE ACCESS	32	538	16,8
	TECHNOLOGY IN SOCIETY	18	501	27,8
	EDUCATION AND INFORMATION TECHNOLOGIES	53	495	9,3
	TRANSPORTATION RESEARCH PART C-EMERGING TECHNOLOGIES	4	465	116,3
	Total	291	8774	
UTAUT/ UTAUT2	SUSTAINABILITY	135	10.505	77,8
	COMPUTERS IN HUMAN BEHAVIOR	112	9.685	86,5
	INTERNATIONAL JOURNAL OF INFORMATION MANAGEMENT	62	7.367	118,8
	BEHAVIOUR & INFORMATION TECHNOLOGY	55	4.973	90,4
	INFORMATION TECHNOLOGY & PEOPLE	47	4.615	98,2
	INFORMATION SYSTEMS FRONTIERS	47	4.499	95,7
	JOURNAL OF RETAILING AND CONSUMER SERVICES	47	4.431	94,3
	TECHNOLOGY IN SOCIETY	47	4.406	93,7
	EDUCATION AND INFORMATION TECHNOLOGIES	62	4.364	70,4
	JOURNAL OF MEDICAL INTERNET RESEARCH	52	3.644	70,1
	Total	666	58489	

Source: Garcia de Blanes et al., 2022

5.2.3. Amount of referenced documents

A higher count in articles reveals the profile of a research domain along with a historical perspective of a research domain. The ten most cited documents for both sets of theories are shown below (table 11).

Table 11. Top referenced documents

Model	Documents	Citation
	Continuance intention to use MOOCs: Integrating the technology acceptance model (TAM) and task technology fit (TTF) model	317
	The technology acceptance model (TAM): A meta-analytic structural equation modeling approach to explaining teachers' adoption of digital technology in education	271
	Developing a General Extended Technology Acceptance Model for E-Learning (GETAMEL) by analysing commonly used external factors	259
	Blockchain adoption challenges in supply chain: An empirical investigation of the main drivers in India and the USA	243
	Understanding the Blockchain technology adoption in supply chains-Indian context	193

TAM/TAM2/TAM3	Understanding consumer intention to participate in online travel community and effects on consumer intention to purchase travel online and WOM: An integration of innovation diffusion theory and TAM with trust	175
	Investigating the influence of the most commonly used external variables of TAM on students' Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) of e-portfolios	172
	Exploring the Implications of Virtual Reality Technology in Tourism Marketing: An Integrated Research Framework	168
	A SEM-neural network approach for predicting antecedents of m-commerce acceptance	163
	Consumer adoption of mobile banking in Jordan Examining the role of usefulness, ease of use, perceived risk and self-efficacy	162
	Total	2123
UTAUT/UTAUT2	Factors Impacting Mobile Banking in India: Empirical Approach Extending UTAUT2 with Perceived Value and Trust	256
	Foresight for online shopping behavior: a study of attribution for what next syndrome	251
	An empirical analysis of factors predicting the behavioral intention to adopt Internet shopping technology among non-shoppers in a developing country context: Does gender matter?	234
	Background and outcomes of internet usage within organisations in Yemen: An extension of the Unified Theory of Acceptance and Use of Technology (UTAUT) model	227
	The role of elaboration likelihood model in consumer behaviour research and its extension to new technologies: A review and future research agenda	218
	Social media and disaster management: Case of the north and south Kivu regions in the Democratic Republic of the Congo	218
	Gender and age: Do they really moderate mobile tourism shopping behavior?	217
	Electronic medical record systems: decision support examination framework for individual, security and privacy concerns using multi-perspective analysis	216
	Being Useful: How Information Systems Professionals Influence the Use of Information Systems in Enterprises	213
	Factors That Influence the Adoption of Enterprise Architecture by Public Sector Organizations: An Empirical Study	207
	Total	2257

Source: Garcia de Blanes et al., 2022

5.2.4. Amount of references by institutions

Table 10 shows the most cited organizations. In TAM/TAM2/TAM3 it is "Univ. Teknol Malaysia" that received the highest citation count (705 citations). On the other hand, in LA UTAUT-UTAUT2 it is "Swansea Univ." that received the highest citation count (1,908 citations).

Table 12. Top referenced institutions

Model	Organization	Documents	Citations	Media / Citation
TAM/TAM2/TAM3	Univ. teknol malaysia	42	705	16.8
	swansea univ.	10	497	49.7
	sultan qaboos univ.	13	420	32.3
	Univ. granada	9	416	46,2
	Univ. salamanca	18	403	22,4
	Univ. ghent	6	364	60,7
	king saud univ.	24	355	14,8
	king abdulaziz univ.	20	349	17,5
	Univ. oslo	4	337	84,3

	Univ. hong kong	8	332	41,5
	Total	154	4,178	
UTAUT-UTAUT 2	swansea univ.	43	1,908	44.4
	Univ. nova lisboa	34	1,192	35.1
	al balqa appl univ.	20	1,158	57.9
	hong kong polytech univ.	29	835	28.8
	sultan qaboos univ.	28	834	29.8
	Univ. arkansas	13	825	63.5
	Univ. malaya	49	797	16.3
	brunel univ. london	18	787	43.7
	Univ. teknol malaysia	54	777	14.4
	swansea univ. bay campus	8	754	94.3
	Total	296	9,867	

Source: Garcia de Blanes et al., 2022

5.3. Structure markers

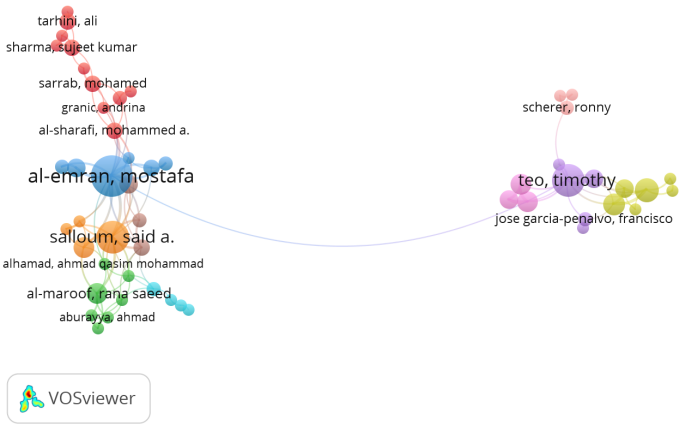
5.3.1. Co-authoring/colaborations mapping

Through the co-authorship networks we can see the existing relationships between the scientific producers who have made a joint publication of the results of their research. The proportion of works can be counted and those individuals who have published the most jointly can be identified.

Analyzing the collaboration networks in the scientific production of the TAM/TAM2/TAM3, the equation used the analysis of co-authorship/ authors integrated from VoSviewer, with a minimum number of documents per autor equaling 2. The total number of documents that have been selected is 705. The map shows the ten main clusters with 113 connections. Each circle representing a node signals a researcher, the proximity of one node to another, shows the co-authorship relationship between the researchers; the colors indicate the groups of researchers that are related to each other. The three most collaborative authors are: Mostafa Al-emran with 18, Said a Salloum, with 14 and Timothy Teo, with 11 collaborations (see graph. 5).

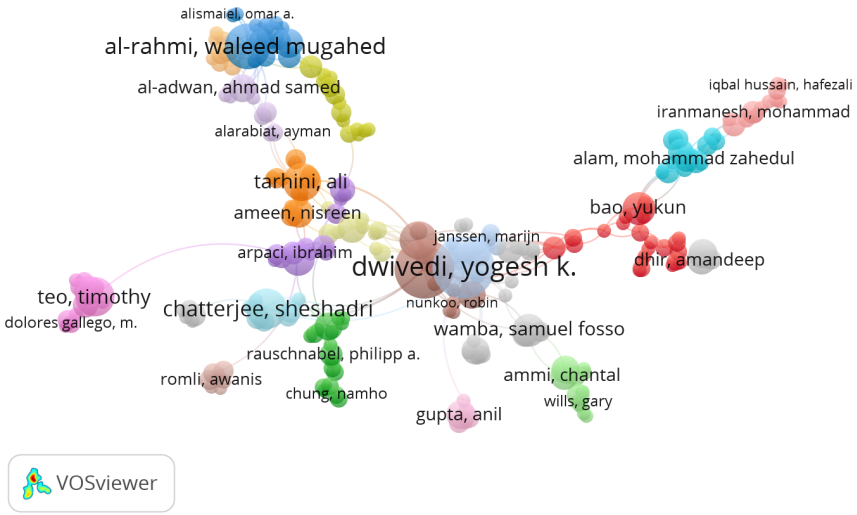
In the UTAUT/UTAUT2 the equation used analysis of co-authorship/ authors integrated from VoSviewer with a ainimum number of documents per autor equaling 2. The total number of documents that have been selected is 246. The twenty-four main clusters with 533 connections are shown on the map. Each node represents a researcher, the proximity of one node to another shows the co-authorship relationship between the researchers, while the colors indicate the groups of researchers that are related to each other. The three most collaborative authors are: Yogesh k dwivedi, with 33, Nripendra p. Rana with 38, and Waleed Mugahed Al-rahmi, with 26 contributions (see graph. 6).

Graphic visualization 5. Co-authoring map (TAM/TAM2/TAM3)



Source: Garcia de Blanes et al., 2022

Graphic visualization 6. Co-authoring map (UTAUT/UTAUT2)



Source: Garcia de Blanes et al., 2022

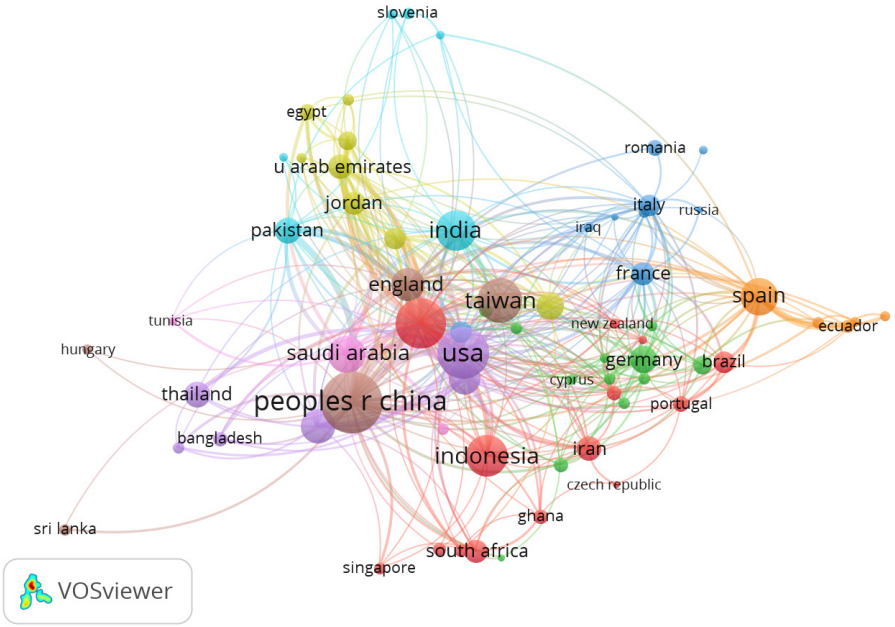
5.3.2. Co-authoring/collaboration between countries map

The map shows the visualization of collaboration between countries. The circles represent the different countries and its size the number of published documents. The strength of co-authorship is reflected in the proximity of one country to another. The countries that are located far from each other, will have a lower co-authorship relationship, while closeness will show a greater strength of collaboration (co-authorship). The clusters are differentiated by colors, which indicate the countries that are relatively related to each other.

Analyzing the collaboration networks in the scientific production of the TAM/TAM2/TAM3, the equation used analysis of co-authorship/countries integrated from VoSviewer. Minimum number of documents per country=5. The total number of countries that have been selected is 69. The nine main clusters with 420 connections are shown on the map. Each node represents a country, and the proximity of one node to another shows the co-authorship relationship between countries; the colors indicate the groupings of countries that are related to each other. The three most collaborative countries are: Peoples R China with 370 documents and 175 connections. It is followed by the USA with 250 documents and 164 connections, and, third, Malasya with 23 documents and 133 connections (see graph. 7).

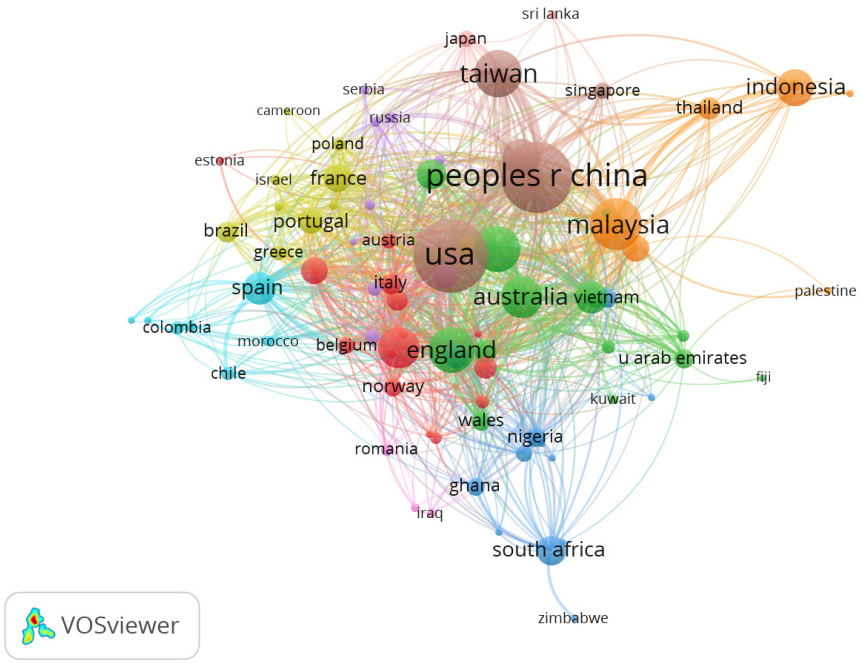
In the UTAUT/UTAUT2 the equation used analysis of co-authorship/countries integrated from VoSviewer. With the minimum number of documents per country set at 5, the total number of countries that have been selected is 80. The top ten clusters with 925 connections are shown on the map. Each node represents a country and the proximity of one node to another, shows the co-authorship relationship between countries; the colors indicate the groupings of countries that are related to each other. The three most collaborative countries are: USA with 821 documents and 565 connections. It is followed by Peoples R. China with 762 documents and 494 connections; third place is for England with 318 documents and 360 connections (see graph. 8).

Graphic visualization 7. Co-authoring & regions map (TAM/TAM2/TAM3)



Source: Garcia de Blanes et al., 2022

Graphic visualization 8. Co-authoring & regions map (UTAUT/UTAUT2)



Source: Garcia de Blanes et al., 2022

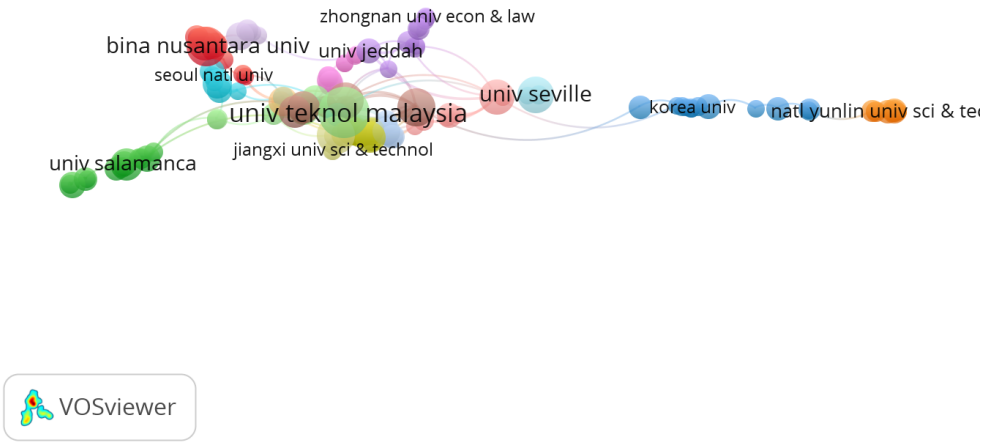
5.3.3. Co-authoring/collaboration institutional map

The map shows the visualization of the collaboration between institutions. The nodes for the different organizations point at the size, to highlight contrast between organizations by the number of published documents. The strength of collaboration is reflected in the proximity of one institution to another. Organizations that are located far from each other will have a lower co-authoring relationship, while closeness will show a greater strength of collaboration (co-authoring). The clusters are differentiated by colors, which indicate the organizations that are relatively linked to each other.

Analyzing the collaboration networks in the scientific production of the TAM/TAM2/TAM3, the equation used analysis of co-authorship/organizations integrated from VoSviewer. The minimum number of documents per organization is 5 and the total number of organizations that have been selected is 166. The sixteen main clusters with 227 connections are shown on the map. Each node represents an organization, the proximity of one node to another shows the co-authorship relationship between organizations, the colors indicate the groupings of organizations that are related to each other. The three most collaborative organizations are: Unive Teknol Malasya with 42 documents and 38 connections. It is followed by King Saud Univ. with 24 documents and 24 connections and the third Univ Sharjah with 11 documents and 22 connections.

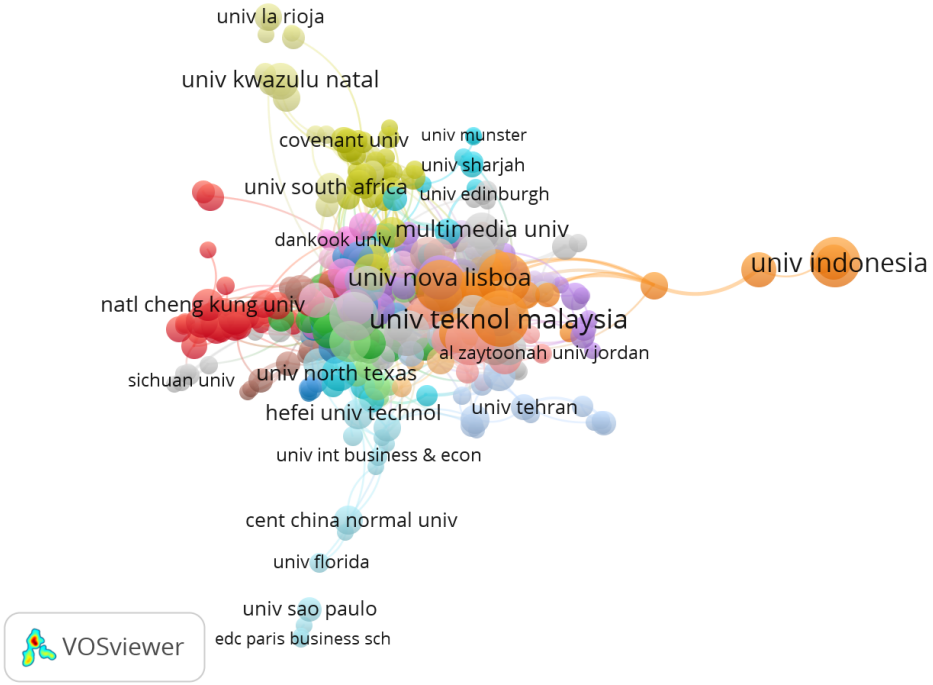
Analyzing the collaboration networks in the scientific production of the TAM/TAM2/TAM3, the equation used analysis of co-authorship/organizations integrated from VoSviewer. Minimum number of documents per organization set at 5 with the number of organizations selected totaling 166. The sixteen main clusters with 227 connections are shown on the map. Each node represents an organization, the proximity of one node to another shows the co-authorship relationship between organizations, the colors indicate the groupings of organizations that are related to each other. The three most collaborative organizations are: Univ. Teknol Malasya with 42 documents and 38 connections. It is followed by King Saud Univ. with 24 documents and 24 connections, and, third, Univ. Sharjah with 11 documents and 22 connections.

Graphic visualization 9. Co-authoring institutions map (TAM/TAM2/TAM3)



Source: Garcia de Blanes et al., 2022

Graphic visualization 10. Co-authoring institutions map (UTAUT/UTAUT2)



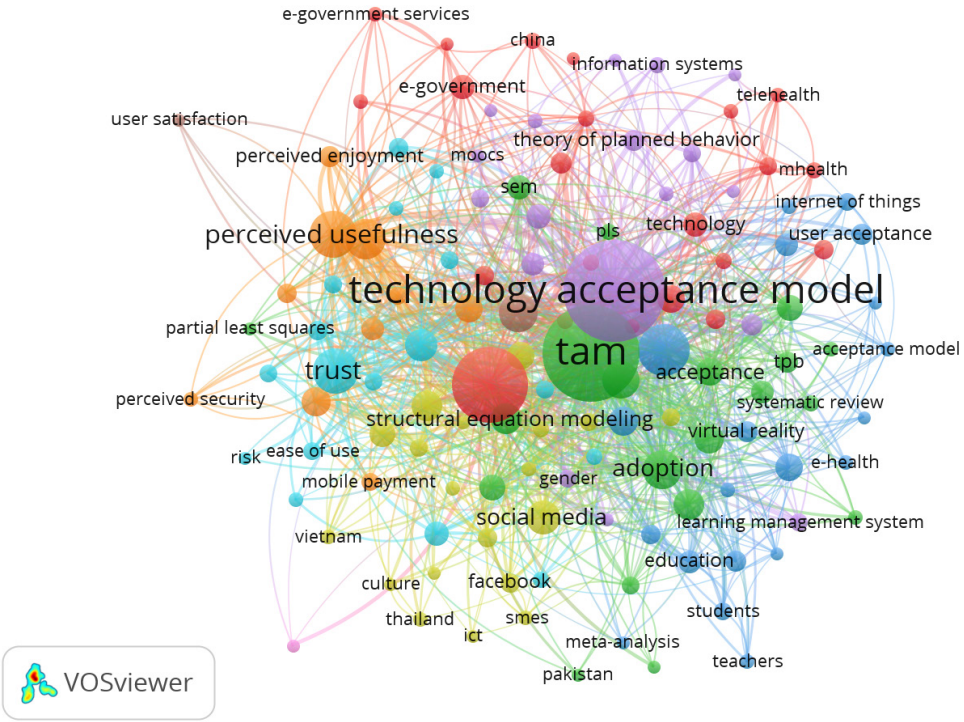
Source: Garcia de Blanes et al., 2022

5.3.1. Keywords/co-ocurrence / keyword clusters

The objective of this dedicated search is to create a map for the co-ocurrency of keywords delimiting the scope of the search to the bibliographic data-set extracted from Web Of Science. Analyzing the collaborative networks in the scientific production of the TAM/TAM2/TAM3, the equation used the analysis of co-occurrence/ author keywords integrated from VoSviewer. The set minimum number repeated keywords, 10, and total number of keywords equals 129. The top nine clusters with 1,892 connections are shown on the map. Each node represents a keyword, with the proximity of nodes showing co-ocurrence for keywords. The colors indicate the groups of keywords that are related to each other (see graph. 11).

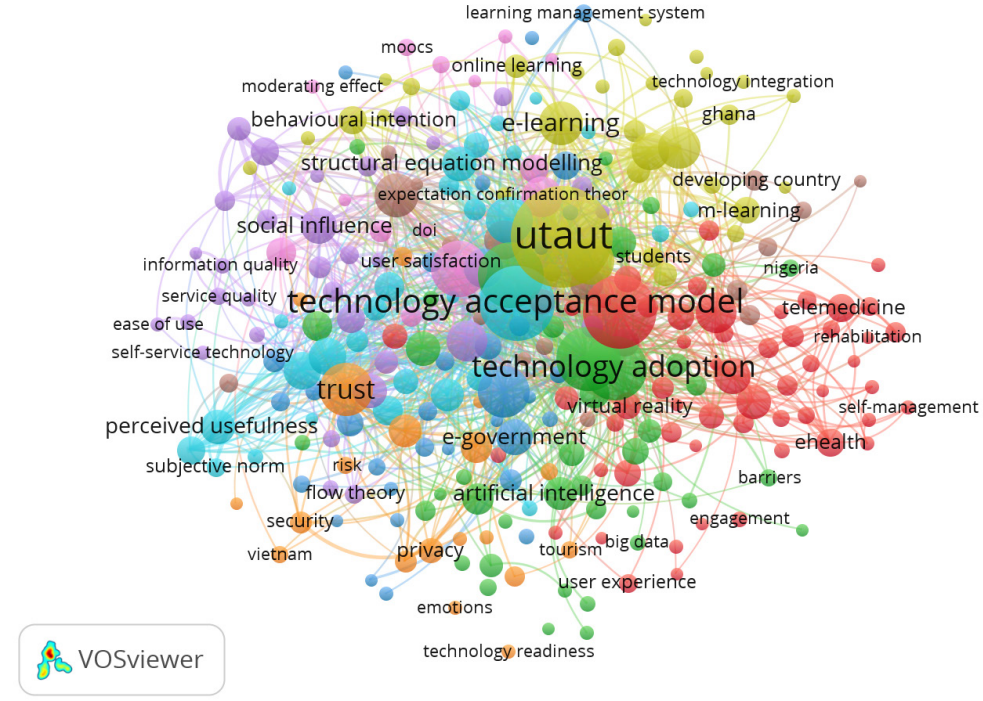
In the UTAUT/UTAUT2 the equation used analysis of co-occurrence/ author keywords integrated from VoSviewer. The set minimum number of repeated keywords, 10, while number of keywords totals 279. The top nine clusters with 5,524 connections are shown on the map. Each node represents a keyword and concurrence of keywords is shown by the proximity of nodes. The colors indicate the groups of keywords that are related to each other (see graph. 12).

Graphic visualization 11. Co-ocurrences keyword map (TAM/TAM2/TAM3)



Source: Garcia de Blanes et al., 2022

Graphic visualization 12. Co-ocurrences keyword map (UTAUT/UTAUT2)



Source: Garcia de Blanes et al., 2022

The analysis of the co-occurrence of words and descriptors yielded different groupings to reflect different approaches and changing trends in investigation, which sheds light on subjects and themes prevalent in the studies:

Table 13. Keywords theme-areas (TAM/TAM2/TAM3)

Cluster	Keywords	#occurrences	Theme areas
Red 1	covid-19	43	Present day and current news, studies trending on development of platforms, COVID19, etc.
	gamification	24	
	smartphone	22	
	Tele-medicine	18	
	mobile apps	17	
Green 2	augmented reality	44	Studies in Technology Adoption for emergent Information Technologies.
	virtual reality	28	
	internet of things	19	
	e-health	12	
	artificial intelligence	11	
Orange 3	trust	120	Studies of variable models for Technology Adoption in diverse contexts
	security	22	
	satisfaction	22	
	usefulness	19	
	privacy	19	
Yellow 4	adoption	90	Education (Technology Adoption in education)
	e-learning	82	
	higher education	54	
	mobile learning	40	
	blended learning	12	
Purple 5	technology acceptance model	593	Evolution of theories and model frameworks for Technology Adoption.
	theory of planned behavior	25	
	innovation diffusion theory	11	
	unified theory of acceptance and use of technology	10	
	theory of reasoned action	10	
Light blue 6	perceived usefulness	125	Analysis of perceptions and usage in Technology Adoption.
	perceived ease of use	92	
	perceived risk	49	
	perceived enjoyment	27	
	perceived security	13	
blue 7	social media	66	Analysis of social media and Business Applications.
	facebook	24	
	information technology	21	
	smes	12	
	social commerce	10	

Source: Garcia de Blanes et al., 2022

Table 14. Keywords theme-areas (UTAUT/UTAUT2)

Cluster	Keywords	#occurrences	Theme areas
Red 1	mhealth	69	Studies relative to Technology Adoption in medical equipment.
	ehealth	44	
	telemedicine	44	
	e-health	26	
	mobile health	24	
Green 2	artificial intelligence	61	Studies relative to Technology Adoption in emergent information technology.
	e-commerce	58	
	cloud computing	54	
	mobile payment	50	
	blockchain	32	
Blue 3	social influence	76	Studies relative to aditional variables to models in Technology Adoption.
	continuance intention	67	
	performance expectancy	45	
	satisfaction	45	
	effort expectancy	34	
Yellow 4	mobile learning	119	Education (Technology Adoption in Education).
	e-learning	108	
	higher education	104	
	online learning	33	
	blended learning	27	
Purple 5	technology acceptance model	311	Theories evolution and models of Technology Adoption.
	theory of planned behavior	122	
	theory of planned behaviour	62	
	innovation diffusion theory	36	
	theory of reasoned action	36	
Orange 6	trust	156	Studies relative to aditional variables in diverse contexts of Technology Adoption.
	privacy	37	
	security	29	
	risk	19	
Light blue 7	intrinsic motivation	13	Studies relative to Technology Adoption in diverse contexts (circular economy, share economy, recycling).
	knowledge sharing	24	
	developing country	24	
	knowledge management	23	
	sharing economy	20	
	wearable technology	19	

Source: Garcia de Blanes et al., 2022

6. Discussion

Since the contrast analysis of diverse angles pointed to strenght areas to focus on both sets of theories, this contrasted framework of characteristics and guidelines, as shown below (see table 15), added a distinctive filter, a nuanced view of technology adoption from an academic, scholarly approach, a highly specialized community, fluent in analysis of sources and text references. Research from bibliometrics provides an enriched outlook into differences in organizational practices and disciplines, and a systematic line of research, into trends for analysis, at a time when the eclosion of data tools for business analysis is becoming prevalent, widely accesible, and with an expansive wave for integrations in consumer technology.

Table 15: Summary of TAM/TAM2/TAM3 and UTAUT/UTAUT2

Features for criteria in bibliographic searches	TAM/TAM2/TAM3	UTAUT/UTAUT2
Year production	Lower number of publications. Currently the pace of Studies continues to grow exponentially.	Higher number of publications. Currently the pace of Studies continues to grow exponentially.
Author production	More likely colaboration with authors (2,69 authors/document). More authors transient & less specialization (27).	Less likely colaboration with authors (2,51 authors/document). More authors specialized & less transient (27).
Journal and Press Data bases production	Top 5 publishers, have less production (56,07%) Bradford applies (nucleo: 57, zone 1: 89, zone 2: 988 revistas).	Top 5 publishers, have more of the total production (61,87%) Bradford model applies (nucleo: 50, zone 1: 320, zone 2: 1,458 revistas)
Country of production	Top 5 countries: Peoples R. China, USA, Malasya & Taiwan. Different country: Indonesia.	Top 5 countries: Peoples R. China, USA, Malasya y Taiwan. Different country: Great Britain.
Language production	Top 3 languages: English & Spanish. Differing language: Portuguese.	Top 3 languages: English & Spanish. Differing language: Chinese
Production according to type of publications	Top publication type, similar for both areas. Articles (73,62%). Second: Proceedings Paper (16,13%)	Top publication type, similar for both areas. Articles (71,50%) Second: Proceedings Papers (22,60%)
Institutional production	Fragmented references to institutions in this field, caused in part, by core evolution and cross-disciplinary approaches.	Fragmented references to institutions in this field, caused, in part, by core evolution and cross-disciplinary approaches.
Production for Categories	Colliding: Education, Educational Research, Computer Science Information Systems, Information Science Library Science Computer Science & Management.	Colliding: Education, Educational Research, Computer Science Information Systems, Information Science Library Science Computer Science & Management.
Number of citations	Less references.	More references per theory.
Number of citations per autor	Less references by author.	More references per author.
Number of citations per journal	Less references by journal.	Major number received for citations per journal.
Number of citations per document	Less references by document count.	More references per document.
Number of citations per institución	Less references per institution.	More references per institution.
Co-authoring/colaboration map	Less references in co-autoring.	Less references in co-authoring.
Co-authoring/colaboration institutional map	Less references in colaborations with other institutions.	Less references in colaborations with other institutions.
Keywords pattern/co-ocurrence keywords	keywords: mental health; artificial intelligence; social influence; mobile learning; trust; knowledge sharing	keywords: covid-19; augmented reality; trust; adoption technology acceptance model; perceived usefulness; social media
Theme and subject matters	Differents Theme and subject matters: 1) Present day and current news, studies trending on development of platforms, COVID19, etc. 2)Analysis of perceptions and usage in Technology Adoption. 3)Analysis of social media and Business Applications.	Differents Theme and subject matters: 1)Studies relative to Technology Adoption in medical equipment. 2)Studies relative to aditional variables in diverse contexts of Technology Adoption. 3)Studies relative to Technology Adoption in diverse contexts (circular economy, share economy, recycling).

Source: García de Blanes et al., 2022

7. Conclusions

TAM/TAM2/TAM3 and UTAUT/UTAUT2 are rapidly growing and widely adopted theories accross research fields in recent years. This study aimed to present in detail the current state of research on both theories, TAM & UTAUT standard, through bibliometric analysis and bibliometric mapping. Through different bibliometric techniques, *Price's Law*, *Lotka's Law*, and *Bradford Model* among others, these theoretical frameworks were accounted from its main characteristics and patterns, in order to depict a global frame of the estate of research; thus, for a better understanding of the current situation around Technology Adoption. Additionally, scientific mapping analysis of the collaborations by countries, authors, and organizations and coexisting keywords provided further analysis from a historical perspective. Research in both sets of theories appears in its mature stage, and continue to grow. Accordingly, this methodological approach helped reveal details of the theoretical basis of the area under study and provided a scope for emerging trends that are taking place in the technology field. From a bibliometric documented approach, UTAUT/UTAUT2 is the most relevant theory in terms of publications, citations and emerging themes, although both sets of theories are currently in use.

Finally, among the limitations found throughout the study, an inherent difficulty in selecting information for applying filters is first and most noticeable hurdle; eventhough the bibliometric data's preliminary cleaning, by elimination of duplicates and error entries, any error will affect the overall count in the final analysis that, if carried out to data exploration, will compromise the process of filtering; such as, it is noted in filtering by keywords.

Regarding future research prospects, the method of analysis translates to other databases, such as, Scopus, or Google Scholar, with the aim of bringing light to specific areas of study within technology (artificial intelligence, mobile learning, payment platforms, etc.), from a bibliometric analysis to further provide contexts of application. This study contributted to an essential understanding of both theory sets, via bibliometrics, by sinthetizing tools and know-how that can help future scholars in establishing a comprehensive bottom ground for research studies.

References

Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision processes*, *50*(2), 179-211. https://doi.org/10.1016/0749-5978(91)90020-T

Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision processes*, *50*(2), 179-211. https://doi.org/10.1016/0749-5978(91)90020-T

Ajzen, I., & Fishbein, M. (1980). *Understanding Attitudes and Predicting Social Behavior.* Englewood Cliffs, N.J: Prentice-Hall.

Al-Emran, M., & Granić, A. (2021). Is it still valid or outdated? A bibliometric analysis of the technology acceptance model and its applications from 2010 to 2020. In *Recent advances in technology acceptance models and theories* (pp. 1-12). Springer, Cham. https://doi.org/10.1007/978-3-030-64987-6_1

Alfadda, H. A., & Mahdi, H. S. (2021). Measuring students' use of zoom application in language course based on the technology acceptance model (TAM/TAM2/TAM3). *Journal of Psycholinguistic Research*, *50*(4), 883-900. https://doi.org/10.1007/s10936-020-09752-1

Alghazi, S. S., Kamsin, A., Almaiah, M. A., Wong, S. Y., & Shuib, L. (2021). For sustainable application of mobile learning: An extended utaut model to examine the effect of technical factors on the usage of mobile devices as a learning tool. Sustainability, 13(4), 1856. https://doi.org/10.3390/su13041856

Alturas, B. (2021). Models of acceptance and use of technology research trends: Literature review and exploratory bibliometric study. In *Recent Advances in Technology Acceptance Models and Theories* (pp. 13-28). Springer, Cham. https://doi.org/10.1007/978-3-030-64987-6_2

Ardanuy, J. (2012). Breve introducción a la bibliometría. *La base de datos scopus y otros e-recursos del CBUES como instrumento de gestión de la actividad investigadora; 1*.

Arfi, W. B., Nasr, I. B., Kondrateva, G., & Hikkerova, L. (2021). The role of trust in intention to use the IoT in eHealth: Application of the modified UTAUT in a consumer context. *Technological Forecasting and Social Change*, *167*, 120688. https://doi.org/10.1016/j.techfore.2021.120688

Balakrishnan, J., Abed, S. S., & Jones, P. (2022). The role of meta-UTAUT factors, perceived anthropomorphism, perceived intelligence, and social self-efficacy in chatbot-based services?. *Technological Forecasting and Social Change*, *180*, 121692. https://doi.org/10.1016/j.techfore.2022.121692

Bandura, A. (1986). *Social foundations of thought and action*. Englewood Cliffs.

Baynes, T. D. (2019). *More than a spasm, less than a sign: Queer masculinity in American visual culture, 1915-1955.* [Doctoral Thesis] The University of Western Ontario. Electronic Thesis and Dissertation Repository, 6238. https://ir.lib.uwo.ca/etd/6238

Bradford, S. C. (1934). Sources of information on specific subjects. *Engineering*, 137, 85-86.

Burch, T.K. (2003) Demography in a new key: a theory of population theory. *Demographic Research, 9(11), 263-284.*

Caldevilla-Domínguez, D., Barrientos-Báez, A., & Blanco Pérez, M. (2022). The City in Cinema: Referenciality throughout the Filming Stages. *Visual Review. International Visual Culture Review, 9*(1), 29-47. https://doi.org/10.37467/gkarevvisual.v9.3084

Cobo, M. J., López-Herrera, A. G., Herrera-Viedma, E., & Herrera, F. (2011). An approach for detecting, quantifying, and visualizing the evolution of a research field: A practical application to the fuzzy sets theory field. Journal of informetrics, 5(1), 146-166. https://doi.org/10.1016/j.joi.2010.10.002

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS quarterly*, 319-340. https://doi.org/10.2307/249008

Davis, F. D., & Warshaw, P. R. (1992). What do intention scales measure? *The Journal of General Psychology*, *119*(4), 391-407. https://doi.org/10.1080/00221309.1992.9921181

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science*, *35*(8), 982-1003. http://dx.doi.org/10.1287/mnsc.35.8.982

Donthu, N., Kumar Badhotiya, G., Kumar, S., Soni, G. and Pandey, N. (2022), «A retrospective overview of Journal of Enterprise Information Management using bibliometric analysis», *Journal of Enterprise Information Managemen*t, 35 (2),504-529. https://doi.org/10.1108/JEIM-09-2020-0375

Durieux, V. & Gevenois, P. (2010) Bibliometric indicators: quality measurements of scientific publication," *Radiology,* 255 (2), 342–351. http://doi.org/10.1148/radiol.09090626

Fishbein, M., & Ajzen, I. (1977). Belief, attitude, intention, and behavior: An introduction to theory and research. *Philosophy and Rhetoric*, *10*(2), 130-132.

Gaviria-Marin, M., Merigó, J. M., & Baier-Fuentes, H. (2019). Knowledge management: A global examination based on bibliometric analysis. *Technological Forecasting and Social Change*, *140*, 194-220. https://doi.org/10.1016/j.techfore.2018.07.006

Iqbal, J., & Sidhu, M. S. (2022). Acceptance of dance training system based on augmented reality and technology acceptance model (TAM/TAM2/TAM3). *Virtual Reality*, *26*(1), 33-54. https://doi.org/10.1007/s10055-021-00529-y

Khan, T., Khan, K. D., Azhar, M. S., Shah, S. N. A., Uddin, M. M., & Khan, T. H. (2021). Mobile health services and the elderly: Assessing the determinants of technology adoption readiness in Pakistan. *Journal of Public Affairs*, e2685. https://doi.org/10.1002/pa.2685

Kumar, S., Pandey, N., Lim, W. M., Chatterjee, A. N., & Pandey, N. (2021). What do we know about transfer pricing? Insights from bibliometric analysis. *Journal of Business Research*, *134*, 275-287. https://doi.org/10.1016/j.jbusres.2021.05.041

Lotka, A. J. (1926). The frequency distribution of scientific productivity. *Journal of the Washington academy of sciences*, *16*(12), 317-323.

Pattnaik, D., Kumar, S., Burton, B., & Lim, W. M. (2022). Economic Modelling at thirty-five: A retrospective bibliometric survey. *Economic Modelling*, *107*, 105712. https://doi.org/10.1016/j.econmod.2021.105712

Price, D. J. S. (1963). *Little science, big science*. New York: Columbia University Press.

Puriwat, W., & Tripopsakul, S. (2021). Understanding food delivery mobile application technology adoption: a UTAUT model integrating perceived fear of COVID-19. *Emerging Science Journal*, *5*, 94-104. 10.28991/esj-2021-SPER-08

Rajak, M., & Shaw, K. (2021). An extension of technology acceptance model for mHealth user adoption. *Technology in Society*, 67, 101800. https://doi.org/10.1016/j.techsoc.2021.101800

Rogers, C. R. (1961). The process equation of psychotherapy. *American journal of psychotherapy*, *15*(1), 27-45. https://doi.org/10.1176/appi.psychotherapy.1961.15.1.27

Rogers, E.M. (1962). *Diffusion of innovations*. Free Press.

Rueda, G., Gerdsri, P., & Kocaoglu, D. F. (2007, August). Bibliometrics and social network analysis of the nanotechnology field. In *PICMET'07-2007 Portland international conference on management of engineering & technology* (pp. 2905-2911). IEEE. 10.1109/PICMET.2007.4349633

Song, H., Ruan, W. J., & Jeon, Y. J. J. (2021). An integrated approach to the purchase decision making process of food-delivery apps: Focusing on the TAM/TAM2/TAM3 and AIDA models. *International Journal of Hospitality Management*, *95*, 102943. https://doi.org/10.1016/j.ijhm.2021.102943

Suo, W. J., Goi, C. L., Goi, M. T., & Sim, A. K. (2022). Factors Influencing Behavioural Intention to Adopt the QR-Code Payment: Extending UTAUT2 Model. *International Journal of Asian Business and Information Management (IJABIM)*, *13*(2), 1-22. 10.4018/IJABIM.20220701.oa8

Tan, K. S., Chong, S. C., Lin, B., & Eze, U. C. (2009). Internet-based ICT adoption: evidence from Malaysian SMEs. *Industrial Management & Data Systems*. 109 (2), 224-244. https://doi.org/10.1108/02635570910930118

Taneja, B., & Bharti, K. (2021). Mapping unified theory of acceptance and use of technology (UTAUT) 2: A taxonomical study using bibliometric visualisation. foresight. https://doi.org/10.1108/FS-08-2020-0079

Taylor, S., & Todd, P.A. (1995). Assessing IT usage: The role of prior experience. *MIS Quarterly,* 19(4), 561–570. http://dx.doi.org/10.2307/249633

Thompson, R.L., Higgins, C.A., & Howell, J.M. (1991). Personal Computing: Toward a Conceptual Model of Utilization. *MIS Quarterly*, 15(1), 124-143. http://dx.doi.org/10.2307/249443

Van Eck, N., & Waltman, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. *scientometrics*, *84*(2), 523-538. https://doi.org/10.1007/s11192-009-0146-3

Venkatesh, V., & Bala, H. (2008). Technology acceptance model 3 and a research agenda on interventions. *Decision sciences*, *39*(2), 273-315. https://doi.org/10.1111/j.1540-5915.2008.00192.x

Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management science*, *46*(2), 186-204. https://doi.org/10.1287/mnsc.46.2.186.11926

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User Acceptance of Information Technology: Toward a Unified View. *MIS Quarterly*, 27(3), 425-478. https://doi.org/10.2307/30036540

Venkatesh, V., Thong, J.Y.L., & Xu, X. (2012). Consumer acceptance and use of Information technology: Extending the Unified Theory of Acceptance and Use of Technology. *MIS Quarterly*, 36(1), 157–178. https://doi.org/10.2307/41410412

Wang, J., Li, X., Wang, P., Liu, Q., Deng, Z., & Wang, J. (2021). Research Trend of the Unified Theory of Acceptance and Use of Technology Theory: A Bibliometric Analysis. *Sustainability*, *14*(1), 10. https://doi.org/10.3390/su14010010

White, H. D., & McCain, K. W. (1989). Bibliometrics. *Annual review of information science and technology*, *24*, 119-186.

Xu, Z., Ge, Z., Wang, X., & Skare, M. (2021). Bibliometric analysis of technology adoption literature published from 1997 to 2020. *Technological Forecasting and Social Change*, *170*, 120896. https://doi.org/10.1016/j.techfore.2021.120896

Zhang, X., Chen, H., Wang, W., & Ordóñez de Pablos, P. (2016). What is the role of IT in innovation? A bibliometric analysis of research development in IT innovation. *Behaviour & Information Technology*, *35*(12), 1130-1143. https://doi.org/10.1080/0144929X.2016.1212403

Zhong, Y., Oh, S., & Moon, H. C. (2021). Service transformation under industry 4.0: Investigating acceptance of facial recognition payment through an extended technology acceptance model. *Technology in Society*, *64*, 101515. https://doi.org/10.1016/j.techsoc.2020.101515