A BIBLIOMETRIC REVIEW OF RESEARCH ON GAMIFICATION IN MARKETING: REFLECTIONS FOR MOVING FORWARD

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ABSTRACT

Gamification has become increasingly popular among businesses, institutions and consumers, especially since the emergence of Covid-19 pandemic. It has been widely used to promote positive changes in user behaviour, improve companies' digital presence and provide immersive and engaging brand experiences. Though bibliometric studies on gamification have been conducted previously, information on citations and networking analysis emphasises marketing and consumer behaviour remains scarce. Thus, the purpose of this bibliometric study is to describe how gamification is structured and how it has evolved over time. To achieve this, we utilise citation analysis and co-word analysis to visually uncover the intellectual, conceptual and social network structures in gamification research. A total of 558 articles published between 2011 and 2021 were extracted

from the Dimension.ai database through the PRISMA review process. The results reveal positive growth in gamification research between 2011 and 2021. The United States was the most productive and most cited country and the most productive and influential institution was Tampere University in Finland, which houses Juho Hamari, the most influential and most cited author. Additionally, the results reveal recent trends in gamification research including those related to value, brand and attitude as well as emerging trends including artificial intelligence. The results also reveal collaborations through co-authorship among authors, institutions and countries. Together, they depict the intellectual landscape of gamification as related to marketing and consumer behaviour. This is beneficial for both inexperienced and experienced scholars, practitioners, funding agencies and policymakers.

INTRODUCTION

The Covid-19 pandemic has transformed people's lives in many ways: it has changed how people work, study and make purchases. Covid-19 forced many countries to adopt and enforce various safety measures, including social distancing and lockdowns, in order to curb contagion. Many people have confined themselves indoors, offices and schools have been closed and streets remain empty of human interaction. These measures, coupled with current digital technologies (Pandya & Lodha, 2021), have increased the adoption of digital devices. People have come to depend on digital platforms for interaction and communication, regardless of their age, culture or country. Work, meetings, shopping, education, socialisation and entertainment suddenly transitioned from taking place offline to online (Pandya & Lodha, 2021). Digital technology has become an enabler which allows people to remain connected despite social distancing measures.

The growth of on-line activity extends also to e-commerce, which has rapidly gained consumer acceptance. The number of people who choose to make purchases online continues to grow daily (Bhatti &

Rehman, 2019). E-commerce has become even more popular due to the Covid-19 pandemic. As a result, competition in the online shopping market has grown increasingly fierce, with many businesses attempting to steer consumer behaviour (Wang & Fesenmaier, 2003). As more businesses compete for consumers and market share, they need new strategies to differentiate themselves from each other. Thus, gamification, a relatively new paradigm for engagement, has been adopted as a strategy to influence and motivate people to participate in a wide range of disciplines including marketing, education, networking, training and health-related activities (Xu et al., 2020).

Gamification is the "use of game design elements in non-game contexts" (Deterding, 2011, p. 1) to make products or services more attractive, engaging and exciting. The term "gamification" was first coined in 2002, but the concept did not become popular until circa 2010 (Mitchell et al., 2020). The incorporation of game features and game-thinking into non-gaming environments may inspire and encourage people, as well as improve their perception and engagement, especially in promoting organisational innovation and sustainable development (Lu & Ho, 2020). The rising trend of gamification marketing impacts not just business marketing strategy, but also changes the consumer behaviour. In addition to increasing sales and profits, gamification also can enhance customer engagement, product/brand recognition and foster customer loyalty (Hamari et al., 2014; Yang et al., 2017).

As the literature continues to advance, gamification will continue to attract research attention. Thus, understanding the intellectual structure of the research conducted within this field is essential. Several studies have extensively examined the use of gamification in various contexts, nevertheless, in the age of e-commerce, the associations of gamification in the marketing context and how it impacts consumer behaviour have rarely been systematically examined. To address these issues, this study uses a bibliometric analysis. In particular, this study aimed to answer the following research questions: (1) What are the overall counts of publications, research disciplines, authors, countries, institutional affiliation, the most prominent journals, articles and authors in gamification especially in the aspect of marketing? (2) How has the knowledge in the field of gamification, especially in marketing, been constructed over time? (3) What are the authors', institutions' and countries' collaborative structures?

This study aimed to highlight the following research objectives: (1) to identify which documents are most influential in the gamification literature especially in the marketing area; (2) to determine the intellectual structure of the field through the co-occurrence of keywords in the gamification literature, and (3) to examine the total link strengths of co-authorship among authors, institutions and countries.

LITERATURE REVIEW

In line with the increased number of studies focusing on gamification experiences, efforts to produce literature reviews summarising insights in gamification and highlighting suggestions for future research have likewise increased (Trinidad et al., 2021). There are four different approaches used to conduct literature reviews: (1) narrative, (2) systematic, (3) meta-analytic and (4) bibliometric. Narrative and systematic approaches are the most commonly used techniques and most gamification reviews fall into this category. They heavily depend on qualitative techniques, which limits the level of data saturation and renders them almost impossible to replicate (Donthu et al., 2021; Trinidad et al., 2021). By contrast, meta-analytic and bibliometric approaches usually entail quantitative studies (Trinidad et al., 2021). Meta-analysis primarily emphasises "summarizing empirical evidence by examining the direction and strength of effects and relationship among variables" (Donthu et al., 2021, p. 287), while bibliometric analysis encapsulates "the bibliometric and intellectual structure of a field by examining the social and structural relationship between different research constituents (e.g., authors, countries, institutions, topics)" (Donthu et al., 2021, p. 287).

Bibliometric methodology involves applying quantitative techniques (e.g., citation analysis) on bibliometric data (e.g., units of publication and citation) (Pritchard, 1969). Bibliometric analysis may be interpreted in two ways: (i) performance analysis and (ii) science mapping. Generally, performance analysis emphasises the contributions of research constituents, while science mapping emphasises the relationships among research constituents (Donthu et al., 2021). These methods are not particularly new (Wallin, 2005), nevertheless, bibliometrics still remains a popular and thorough

approach for investigating and examining large amounts of scientific data. It not only allows us to explore the evolution nuances of a specific field, but it also gives directions on the emerging topics in that field under investigation (Donthu et al., 2021).

However, in many instances, the bibliometric method has not been exploited to the fullest extent possible (Donthu et al., 2021). Bibliometrics has gained immerse popularity in various fields in recent years, especially in business (Kumar et al., 2021), finance (Molina-Collado et al., 2021), management (Ellegaard & Wallin, 2015; Zupic & Čater, 2015) and marketing (Donthu et al., 2021; Donthu et al., 2021; Fetscherin & Heinrich, 2015; Hu et al., 2019; Ribeiro et al., 2020). These articles apply bibliometric analyses to publication, identifying patterns of collaboration, and discovering a field's intellectual structure. Indeed, the development of scientific research itself contributed to the rapid growth of bibliometric analysis (Donthu et al., 2021). The popularity of bibliometric method is attributed to a variety of reasons, including (i) the availability, convenience and advancement of suitable software, including Leximancer, Gephi and VOSviewer, as well as the availability of large bibliographic databases such as the Web of Science and Scopus, and (ii) quantify cross-disciplinary research activity. Moreover, the reputation of bibliometric method, particularly in business research, is not merely a trend, but rather a manifestation of its functionality for (a) handling massive amounts of data, and (b) creating high research impact (Donthu et al., 2021).

Over the years, several studies have discussed and applied gamification in their research. Initially, gamification was applied in business and marketing (Huotari & Hamari, 2017; Nobre & Ferreira, 2017; Wolf et al., 2020), and subsequently in other fields including education (Ab. Rahman et al., 2018; Azzouz Boudadi, 2020; Chans, 2021), safe driving (Klemke et al., 2014; Nousias et al., 2019; Steinberger et al., 2016), software development (Dal Sasso et al., 2017; Platonova & Bērziša, 2018; Shahid et al., 2019) and healthcare (Edwards et al., 2016; Sardi et al., 2017). For instance, Tobon et al. (2020) analysed a total of 36 empirical papers (i.e., articles and conference proceedings) from Scopus and the Web of Science (WoS), published between 2010 to 2019, focusing on the literature related to gamification and online consumer decisions. The analysis was conducted using SciMAT. The

findings were visually depicted on the Cartesian plane to provide an overview of the literature and the prevalent themes within the subject. The researchers demonstrated that the presence of game elements in the non-game activities has a substantial influence on consumer engagement and online consumer decisions in digital environments. However, the study did not look into gamification in other areas such as education, health and the environment. A perfectly curated bibliometric study could develop a solid basis for advancing in novel and profound ways: such studies allow scholars to (1) acquire overall insights, (2) pinpoint knowledge gaps, (3) gain novel ideas for future endeavours and (4) plan contributions to the field (Donthu et al., 2021).

METHODOLOGY

This study utilises bibliometric methods to analyse existing literature related to gamification. Articles on gamification were extracted by using the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) process, which involves three phases: (1) identification, (2) screening and (3) application of inclusion and exclusion criteria. In the first phase, the literature search is performed using the Dimension.ai database, an inter-linked research information system provided by Digital Science and its portfolio companies. This platform was chosen because it provides a comprehensive collection of linked data in a single platform, including the number of times each publication has been cited.

The aim of this study is to explore the intellectual structure of the research conducted within the gamification field in the marketing context, taking into consideration its impacts on consumer behaviour. Thus, the keyword searches included "gamification" OR "gaming" AND "marketing" OR "consumer behavior". This keyword search produced a total of 585 articles. In the second phase, these articles were screened according to the following criteria: (1) document type, (2) publication year, and (3) language. The third phase involved the application of inclusion and exclusion criteria; Table 1 exhibits the criteria used. The screening process generated a total of 563 articles and after filtering out non-gamification articles, we obtained the list of 558 articles that underwent bibliometric analysis.

Table 1

Inclusion and Exclusion Criteria

Criteria	Inclusion	Exclusion
Document type	Articles	Chapters, conference proceedings, pre-printed material, monographs and edited books
Publication years	2011 – 2021	No exclusion in publication years
Language	English	Non-English

Our study aimed to identify which articles that analysed gamification were most influential. Hence, we adopted the citation analysis, a basic technique for disciplinary mapping which assumes that citations reflect intellectual linkages between publications, formed when one publication cites another (Appio et al., 2014). This analysis allowed us to ascertain the most influential publications in the field to gain an understanding of the field's intellectual dynamics. Additionally, the study also aimed to determine the intellectual structure of the field through co-word analysis, which seeks to "explore the existing or future relationships among topics in a research field by focusing on the written content of the publication" (Donthu et al., 2021, p. 289). Unlike other analyses that utilise and emphasise either cited or citing publications, the co-word analysis examines author-supplied keywords; if these are absent, the article titles, abstracts and the full text can also be examined (Donthu et al., 2021). This analysis method reflects the thematic relationships among publications.

RESULTS AND DISCUSSIONS

Descriptive Analysis

From 2011 to 2021, a total of 558 articles were published in the journals. Their temporal distribution indicates growth in the field and scholarly engagement in gamification, marketing and consumer behaviour. Figure 1 shows a continuous increase in academic interest in the field from 2011 to 2021, via an increasing number of publications every year.

Figure 1

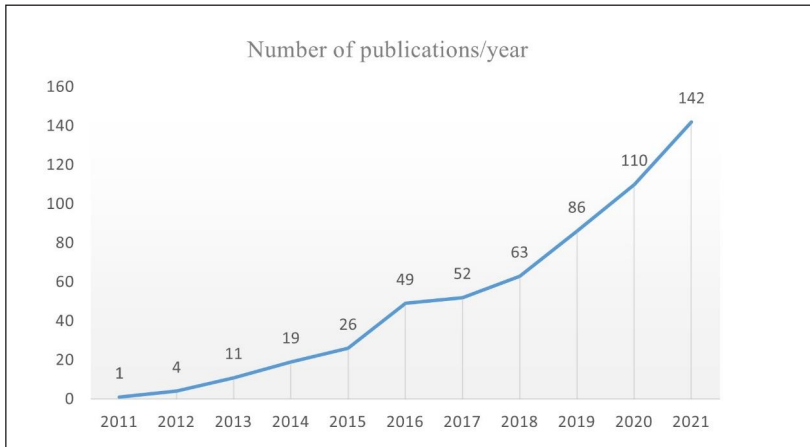*Annual Publications on Gamification in Marketing and Consumer Behaviour in the Dimensions.ai Database*
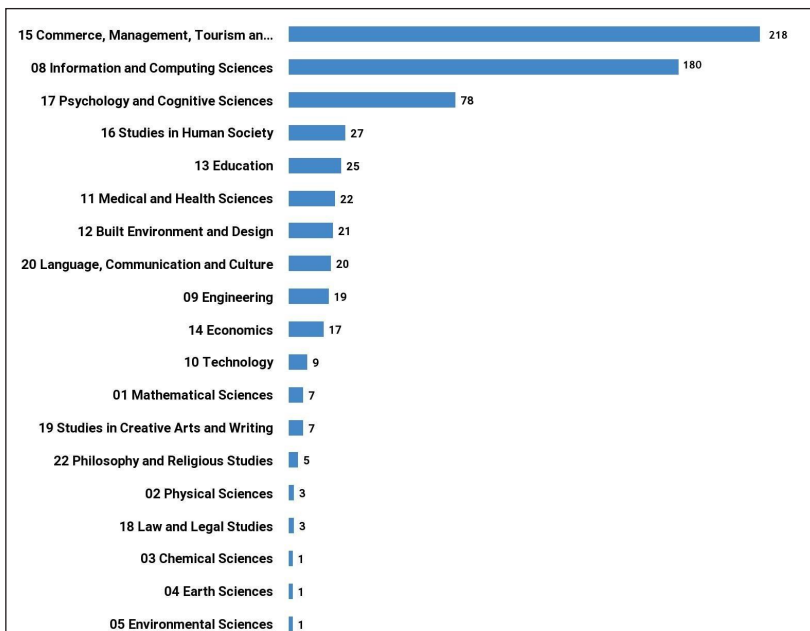

Figure 2

Number of Publications on Gamification in Each Research Category

Figure 2 illustrates the distribution of research on gamification related to marketing and consumer behaviour by research discipline. The greatest number of articles were categorised under commerce, management, tourism and services with 218 articles, followed by information and computing sciences with 180 articles and psychology and cognitive sciences with 78 articles. This indicates that, though the scope here is to explore gamification, marketing and consumer behaviour, the context and background of the studies varies in disciplinarily. The studies were indeed diverse, ranging from commerce, management, tourism and services to earth sciences and environment sciences.

Among the articles studied, the most prolific author was Juho Hamari, as shown in Figure 3. He published 29 documents, followed by Jonna Koivisto and Sara Catalán with six documents each as well as Yogesh K. Dwivedi and Chia-Lin Hsu with five documents each.
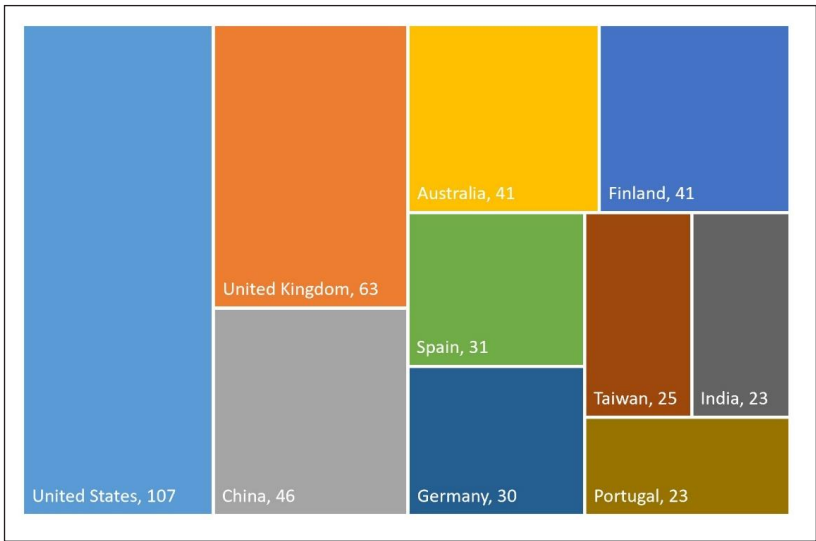
Figure 3

Document Counts according to Authors Extracted from Dimension.ai from 2011 to 2021
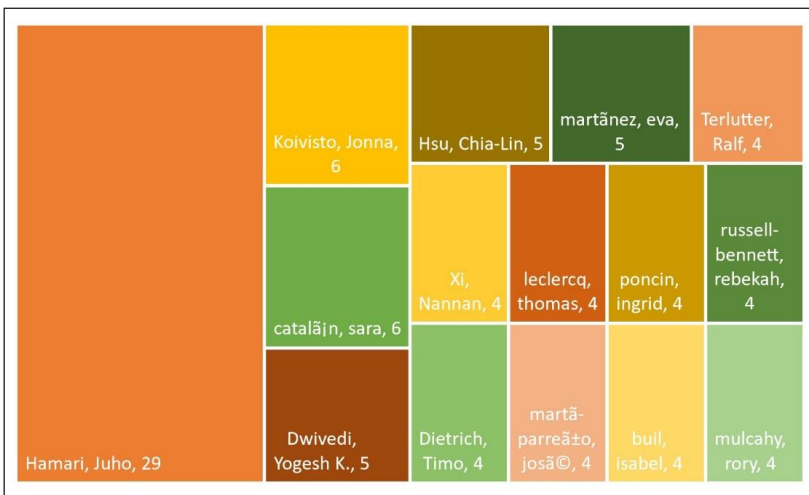
Additionally, regarding the number of documents published on gamification research related to marketing and consumer behaviour from 2011 to 2021, the United States was the most productive country with 107 documents, followed by the United Kingdom with 53 documents and China with 46 documents (see Figure 4).

Figure 4

Document Counts by Country Extracted from Dimension.ai from 2011 to 2021

Furthermore, as shown in Figure 5, researchers at Tampere University published the most documents in this category. They published 32 documents, followed by University of Turku with 18 documents and Queensland University of Technology with eight documents.

Citation Analysis

Most-cited journals

In this section, we classify the most cited journals and papers in the field of gamification, specifically as related to marketing and consumer behaviour. Of the 558 articles chosen for the bibliometric analysis, 20 journals were identified as publishing scholarly work on gamification

focusing on marketing and consumer behaviour. As observed in Table 2, the *International Journal of Information Management* was cited most often, with 1,354 citations. Likewise, *Computers in Human Behavior*, the *Journal of Interactive Marketing* and the *Journal of Business Research* were among the journals most frequently cited, with 1,184, 593, and 402 citations, respectively. These findings imply that the journals with the highest number of citations and hence the articles published in them, were similar in scope. For instance, the *International Journal of Information Management* aims to foster excellence in analysis and discussion in the developing field of information management, while the *Computers in Human Behavior* is dedicated to exploring the use of computers from a psychological viewpoint (this includes human exchanges with computers, not computers per se). Likewise, the *Journal of Interactive Marketing* aims to explore issues and outline thoughts linked to the rapid growth of the interactive marketing field, comprising both online and offline subjects related to the analysis, targeting and service of individual customers. Aligned with the definition of gamification itself, the "use of game design elements in non-game contexts" (Deterding, 2011, p. 1), these top three journals intend to investigate the interactions between technology and human beings.

Figure 5

Document Counts by Institutional Affiliation, Extracted from Dimension.ai from 2011 to 2021
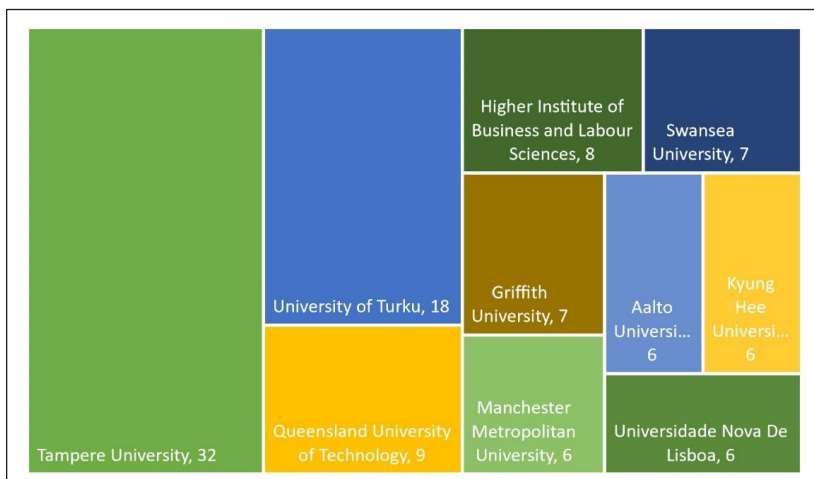
Table 2

Most-cited Journals on Gamification and their Total Link Strength

Source	Documents	Citations	IF (2 years)	Total link strength
International Journal of Information Management	21	1354	14.098	6384
Computers in Human Behavior	28	1184	6.829	4652
Journal of Interactive Marketing	10	593	6.258	1455
Journal of Business Research	19	402	7.55	4422
Internet Research	8	322	6.773	1431
International Journal of Human-Computer Studies	7	260	3.632	1521
Telematics and Informatics	9	236	6.182	1653
Sustainability	16	213	3.251	2326
Technological Forecasting and Social Change	6	122	8.593	1296
Journal of Retailing and Consumer Services	10	114	7.135	1679
User Modeling and User-Adapted Interaction	6	114	4.412	1576
International Journal of Electronic Commerce	5	91	4.300	434
Journal of Marketing Education	5	81	4.300	162
Information Technology and People	5	56	4.4	1518
Journal of Service Management	5	56	10.0	1302
Journal of Consumer Behaviour	6	45	3.280	493
Psychology And Marketing	6	27	2.939	1091
Behaviour And Information Technology	6	22	3.086	1134
International Journal of Consumer Studies	9	16	3.864	509
Information System in Management	6	0	2.098	12

Additionally, it should also be noted that highly cited journals may not have high impact factors. Many researchers believe that papers

published in journals with high impact factors will be more frequently cited than those published in journals with low impact factors; this is inaccurate (Scully & Lodge, 2005; Seglen, 1997), as a journal that is less frequently cited may achieve a much higher impact factor than the one that is more frequently cited. For example, *Journal of Service Management* was only cited 56 times, but its 2-year impact factor was 10, which is much higher than the other journals that are cited more frequently. Therefore, it can be concluded that, although *Journal of Service Management* is less frequently cited than other journals, its higher impact factor of 10 implies a good citation count.

Figure 6

Network Visualisation of the Most Cited Journals
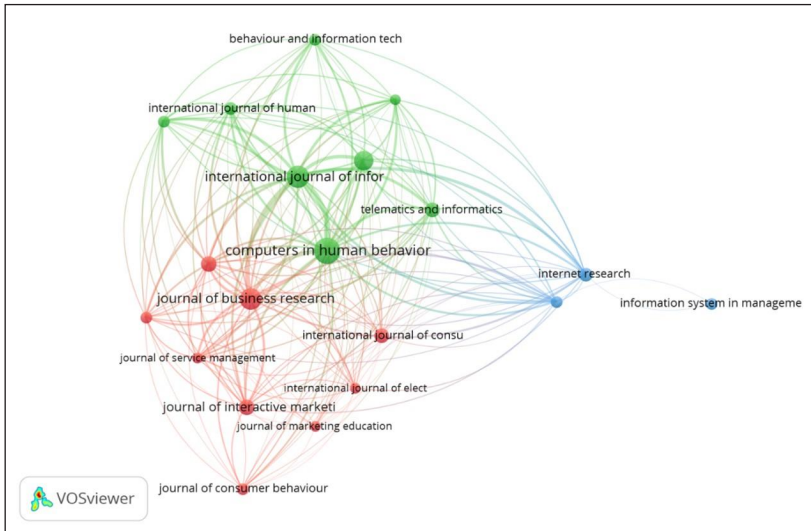
Figure 6 depicts the network for the most cited journals; it depicts the total link strength among them. The total link strength represents the total strength of the co-authorship links of a given researcher with other researchers. It is observed that the *International Journal of Information Management*, *Computers in Human Behavior* and *Journal of Business Research* have the thickest lines and therefore, the highest number of citations and greatest link strength among the journals.

Table 3

Ten Most Cited Papers on Gamification

Authors	Title	Journal	Total citations
Hamari (2013)	Transforming homo economicus into homo ludens: A field experiment on gamification in a utilitarian peer-to-peer trading service	Electronic Commerce Research and Applications	358
Koivisto and Hamari (2019)	The rise of motivational information systems: A review of gamification research	International Journal of Information Management	280
Terlutter and Capella (2013)	The gamification of advertising: Analysis and research directions of in-game advertising, advergames and advertising in social network games	Journal of Advertising	225
Hamari and Koivisto (2015)	Why do people use gamification services?	International Journal of Information Management	223
Shankar et al. (2016)	Mobile shopper marketing: Key issues, current insights and future research avenues	Journal of Interactive Marketing	177
Subhash and Cudney (2018)	Gamified learning in higher education: A systematic review of the literature	Computers in Human Behavior	140
Yang et al. (2017)	Examining the impact of gamification on intention of engagement and brand attitude in the marketing context	Computers in Human Behavior	129
Hamari (2015)	Why do people buy virtual goods? Attitude toward virtual good purchases versus game enjoyment	International Journal of Information Management	121
Xi and Hamari (2019)	Does gamification satisfy needs? A study on the relationship between gamification features and intrinsic need satisfaction	International Journal of Information Management	119
Harwood and Garry (2015)	An investigation into gamification as a customer engagement experience environment	Journal of Services Marketing	117

Most-Cited Papers

Citation analysis was conducted for the most cited and most notable documents in each research field. Papers that were cited frequently were considered to have more substantial influence on the specific topic than those that were cited infrequently (Merigó et al., 2016). Table 3 displays the papers with the highest number of citations. Among the ten most cited papers, four were literature reviews: Koivisto and Hamari (2019), in "The rise of motivational information systems: A review of gamification research", offered a comprehensive review of gamification research. Terlutter and Capella (2013) offered reviews of literature on in-game advertising, advergames and advertising in social network games. Shankar et al. (2016) offered a detailed discussion of mobile shopper marketing and its scope and they proposed a process model which connects the mobile shopping journey with four key elements: shoppers, employees, organisations and mobile technology. They also suggested that gamification should be explored as the means of creating incentives to motivate and engage employees in the mobile aspects of the shopping experience and to accommodate mobile shoppers. Last but not least, Subhash and Cudney (2018) presented a systematic literature review regarding game-based learning system, which incorporates the elements of game design and the application of gamification in higher education. Their study focused on identifying and classifying the applicability of gamified learning systems in higher education.

Most-Cited Authors

We also identified the most cited authors on gamification. Citations are commonly used as a performance indicator in research (Aksnes et al., 2019). Generally, highly cited papers are expected to represent extraordinary work and eventually how often an author's work is cited may be used to determine the scholarly excellence (Langfeldt et al., 2015). Table 4 presents the 20 most cited authors on gamification. As shown by Table 4, the top-ranked author, Juho Hamari, obtained a total of 2,155 citations over the years, from a total of 29 total publications on gamification.

However, there are many driving forces or motivations that should be discussed when determining the quality of a work, such as *h*-indices,

co-authorship, journal impact factors, journal rankings and source-normalised impact per paper (SNIP) (Yaminfirooz & Ardali, 2018). *H*-indices represent the likelihood that an author will be cited and this indicator is widely used to evaluate the activity of individual researchers (González Alcaide & Gorraiz, 2018). The co-authorship of the first author or a corresponding author with the authors with high *h*-indices can increase the citability of co-authored documents (Yaminfirooz & Ardali, 2018), while impact factor (IF) is a measure applicable to a journal; it "is a measure of frequency with which the 'average article' has been cited in a particular year or period" (Scully & Lodge, 2005, p. 391).

Table 4

20 Most Cited Authors on Gamification

Author	Documents	Citations	h-index
Hamari, Juho	29	2155	43
Koivisto, Jonna	6	748	17
Terlutter, Ralf	4	323	17
Bilgihan, Anil	3	281	32
Dwivedi, Yogesh K.	5	261	71
Xi, Nannan	4	180	6
Dietrich, Timo	4	159	13
Schuster, Lisa	3	159	13
Loureiro, Sandra Maria Correia	3	155	28
Costa, Carlos J.	3	145	12
Oliveira, Abilio	3	145	11
Rodrigues, Luis Filipe	3	145	7
Nakajima, Tatsuo	3	124	23
Harwood, Tracy	3	122	10
Hsu, Chia-Lin	5	117	23
Leclercq, Thomas	4	111	7
Poncin, Ingrid	4	111	12
Ponnet, Koen	3	103	30
Vanwesenbeeck, Ini	3	103	7
Walrave, Michel	3	103	27

Most of the most frequently cited authors had relatively high *h*-indices as well. For instance, Juho Hamari, who ranked first with 2,155 citations, had a high *h*-index (viz. 43). Similarly, Jonna Koivisto

and Ralf Terlutter, who ranked second and third with 748 and 323 citations, respectively, also had high *h*-indices (both 17). However, we also noticed that some authors who were cited relatively infrequently had relatively high *h*-indices. For instance, Yogesh K. Dwivedi, who ranked fifth with 261 citations, had a substantial *h*-index of 71. This may be due to the number of factors; for example, the citations in Table 4 were limited to documents on gamification, while the author may have published in other disciplines (Dwivedi has published a wide range of articles in social media marketing, digital marketing and information systems).

Co-word Analysis

The intellectual structure of the field was interrogated through the co-word analysis. Co-word analysis is used to explore the existing and the future relationships in the topos by constructing a map, based on a co-occurrence matrix, based in turn on the keywords in the titles and abstracts of each article. In this study, a minimum threshold of ten co-occurrences of each term was used. Based on this co-occurrence threshold, 236 words were identified and illustrated using VOSviewer.

In this map, each colour represents a thematic cluster and the nodes and links within that cluster indicate topics related to the theme (nodes) and the relationships (links) among the nodes that manifest the theme (cluster). A node in a network represents an entity (here, a keyword or topic), the size of a node represents how many times a keyword or topic occurs, links among nodes represent co-occurrence among the keywords and the thickness of a link represents the occurrence of co-occurrences among the keywords (i.e., the number of times the keywords co-occur together). Thus: the bigger the node, the greater the occurrence of the keyword and the thicker the links between nodes, the more frequent the co-occurrences among the keywords.

As illustrated by Figure 7, topics such as value, brand, attitude, enjoyment, flow, medium, product, advergame, player and practice occur most frequently in the gamification articles examined. Additionally, other topics are located in the same cluster as "value", including enjoyment, satisfaction and loyalty; the fact that these topics are close together indicates that they are strongly related to each other. The analysis produced nine clusters in total. The names of these clusters and the percentages of each cluster are presented in

Figure 8. The largest cluster is related to the topic of value, followed by brand, attitude, flow, product, advergame, practice, experiment and stage. This finding indicates that these topics or themes have been extensively explored within the gamification field. These themes are considered important, as indicated by their many links to other themes; they are also highly developed, as illustrated by the bigger nodes and the links with other nodes being thicker.

Figure 7

Network Visualisation of Keywords Co-Occurrence in Gamification and Marketing as Well as Consumer Behaviour
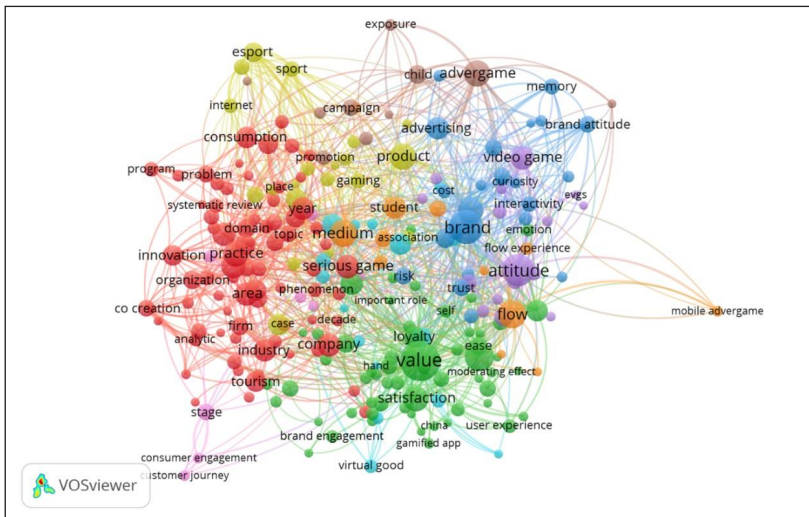

Additionally, findings also revealed several small nodes including artificial intelligence, bitcoin, hospitality, important role, new medium, PLS SEM and structural equation model; the smallness of these nodes indicates that these topics occur less often than others in the gamification field. This signifies that these topics are not highly developed and that there is a lack of coverage on these topics in the gamification field, particularly related to marketing and consumer behaviour. Therefore, researchers may consider the opportunities for future research related to these topics. Instead of exploring topics or themes that are already highly developed and saturated, which might provide limited or no contributions, it will be more beneficial if

researchers can discover and provide insight into topics that have yet to be explored and contribute to the body of knowledge.

Figure 8

Network Visualisation of Keywords in Gamification and Marketing as well as Consumer Behaviour in VOSviewer
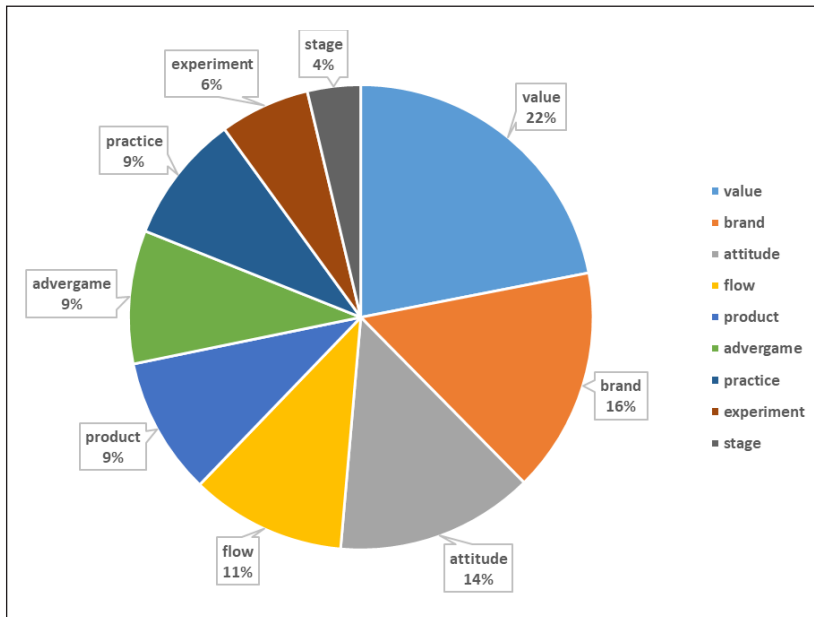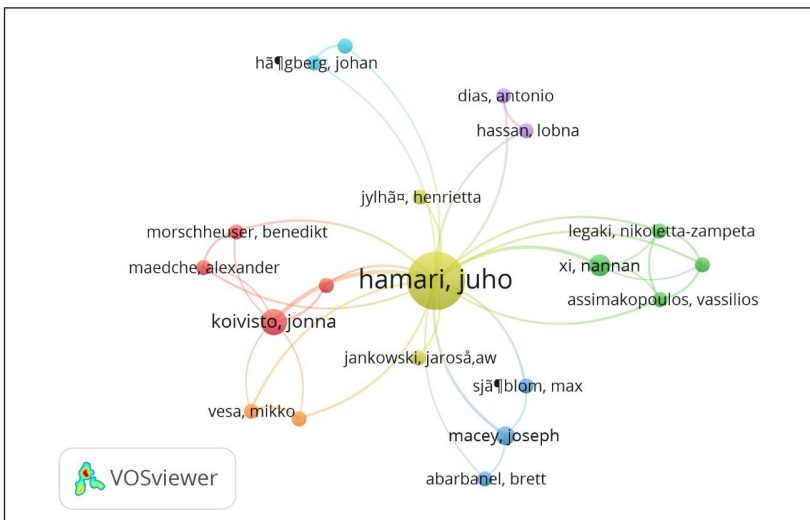

Co-authorship between Authors

Co-authorship represents a direct working relationship among authors (Youngblood & Lahti, 2018), specifically whether an author has collaborated with others when writing an article. Co-authorship is commonly used as a proxy for scholarly collaboration in bibliometric studies (Youngblood & Lahti, 2018). Figure 9 visualises the co-authorship network, which contains seven clusters. It is observed that the core author, who acquired the greatest number of co-authorship links is Juho Hamari, who has links to 19 other authors, resulting in four clusters. Hamari's co-authors include Jonna Koivisto, Benedikt Morschheuser, Alexander Maedche, Nicolai Hanner, Nannan Xi, Nikoletta-Zampeta Legaki, Kostas Karpouzis,

Vassilios Assimakopoulos, Mikko Vesa, Harald Warmelink, Jaroslaw Jankowski, Henrietta Jylha, Max Sjblom, Joseph Macey, Brett Abarbanel, Lobna Hassan, Antonio Dias, Johan Halgberg and Erik Wastlund. These findings imply that, although the gamification field related to the marketing and consumer behaviour has grown larger over the past several years and an increased number of papers have been published in top-tier journals, co-authorship among authors with the same interest remains scarce. The gamification field largely depends on a single source author who is linked to many others. Thus, the gamification network circle has not been as extensive as those of other fields within marketing research.

Figure 9

Network Visualisation of Co-Authorship between Authors in Gamification and Consumer Behaviour

Co-authorship between Institutions

Figure 10 illustrates the co-authorship links between institutions. As observed in Figure 10, the illustrated links form two clusters. The first cluster is formed by University of Waterloo, Queensland University of Technology and University of the Sunshine Coast, while the second cluster is formed by Griffith University and Temple University.

Figure 10

Network Visualisation of Co-Authorship between Institutions in the Field of Gamification and Consumer Behaviour
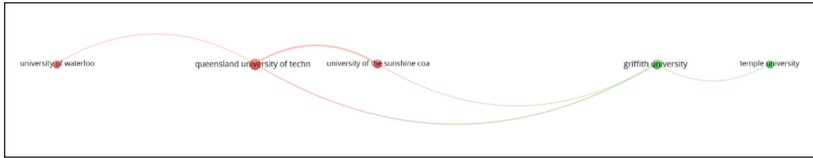

Figure 11

Network Visualisation of Co-authorship among Countries in the field of Gamification related to the Consumer Behaviour
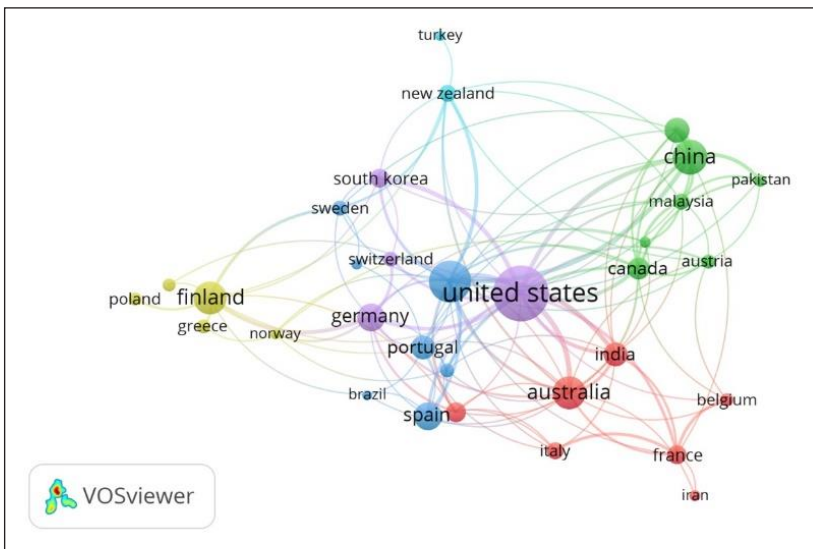

Figure 10 shows that most co-authorship in gamification and consumer behaviour occurs among Queensland University of Technology, University of the Sunshine Coast, University of Waterloo and Griffith University. This indicates that the topic of gamification, particularly in the context of marketing and consumer behaviour, is a popular topic in Australia and Canada. However, it is important to note that these findings do not necessarily universally portray research

coverage in each country. This is because each institution's research interests and concentrations vary. Hence, other global institutions can take the opportunity to contribute works, particularly in the field of gamification and consumer behaviour, to fortify links among institutions worldwide.

Co-authorship between Countries

Figure 11 visualises the co-authorship network between countries in the field of gamification within consumer behaviour research. As illustrated by Figure 11, co-authorship appears to be prominent in the United States, which has 19 links, including to the United Kingdom, China, Australia, Finland and New Zealand. This indicates that this research is conducted between both Eastern and Western countries. Furthermore, it is observed that Malaysia contributed to 11 co-authorship links with other countries. This implies that, even as a relatively small country, Malaysia has displayed significant interest in the field of gamification as related to consumer behaviour.

CONCLUSION, LIMITATIONS AND DIRECTION FOR FUTURE RESEARCH

This study utilised a bibliometric approach to visualise and analyse the structure and evolution of gamification research from 2011 to 2021, based on the data collected from Dimension.ai. Based on the keyword search, initially 585 articles were extracted, of which 558 articles were utilised for further analysis. We mapped the research landscape using the citation analysis to identify the most influential documents in the research field, while the intellectual structure of the field was determined using co-word analysis.

This study reveals that, in 2011, few works on gamification were published; however, the field had grown steadily through to 2021. Though research on gamification has been produced under diverse categories, most articles were produced in the disciplinary topos of commerce, management, tourism and services. The most productive countries were the United States, the United Kingdom and China, and the most-cited articles were produced in the United States, the United Kingdom and Finland. Tampere University was the most

productive and influential institution; this may be primarily due to the fact that it houses the most influential and cited author, Juho Hamari. The *International Journal of Information Management* was the most cited journal, and *Computers in Human Behavior* published the greatest number of articles. The analysis of authors' collaboration networks revealed a moderate degree of collaboration among the most productive authors in the field; specifically, seven clusters were produced. Collaboration is primarily centred on the most influential author, Juho Hamari, who produced a total of 19 links to other authors, resulting in four clusters. Meanwhile, an analysis of collaboration involving in co-authorship between institutions revealed only a small degree of collaboration, with two clusters. The first cluster is formed by the University of Waterloo, Queensland University of Technology and University of the Sunshine Coast. The second cluster is formed by Griffith University and Temple University. These findings revealed that co-authorship was more prominent in the United States.

The study also created visualisations depicting how the structure of gamification research related to marketing and consumer behaviour has grown over time. Analyses confirmed that gamification has mostly been used to enhance the product value, brand image and consumer attitude. These topics or themes are commonly found within the domain of commerce, management, tourism and services, which is consistent with our findings – whereby it is found that a large number of articles on gamification were produced within the commerce, management, and tourism and services field. This implies that a high interest in the application of gamification to commerce, management, tourism and services has been consistently growing and diversifying throughout the years.

The results of the analysis identify potential areas of interest for future research. Among these are artificial intelligence, bitcoin and hospitality; these can be investigated in combination with gamification, a new medium and the structural equation model approach can be utilised in future gamification research. For instance, the application of artificial intelligence (AI), especially machine learning (ML) in gamification offers automated tools and facilitates data analysis (Garcia da Luz et al., 2021). It will be interesting to explore AI and gamification, as both have become popular in business. To achieve this, it will be important

to explore the application of machine learning to better facilitate gamified experiences.

Nonetheless, this study also has several limitations. First, the accuracy and validity of bibliometric studies depend on the dataset and its source. Because our dataset was obtained from the Dimension. ai database, future researchers may replicate and expand this study using datasets built from searches of the Web of Science, Scopus, and Google Scholar databases. Second, the study does not specifically take citation index into account as we incorporated all works in the form of articles. However, we do not consider this a limitation affecting the replicability of this study because this study offers a reliable and valid overview of the analysis on gamification as related to marketing and consumer behaviour. The study also accommodates both experienced and inexperienced authors in the field. Nevertheless, future researchers aiming to discover different perspectives can also filter documents according to the citation indexes.

In sum, the results found through bibliometric analysis in this study will be useful for both established and emerging scholars who wish to pursue research in the gamification field. More importantly, the study, in its efforts to identify the most influential documents, revealed the intellectual structure of gamification research. Results of this study can provide future researchers with an overview establishing networks and linkage in the gamification field. It also aims to stimulate further research and discussion among scholars on the nature of research areas within gamification related to the marketing and consumer behaviour, pertaining to the prevalence or dearth of scholarly works on certain topics. This study will also motivate researchers to participate in novel studies to gain insights into the field of gamification in marketing. Finally, this study serves as a benchmark and provides guidance for researchers and marketers participating in co-authorship.

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